Metals Review
THE NEWS DIGEST MAGAZINE

Volume XXIV - No. 8 August, 1951

MEMO TO YOU:

The Metal Show Starts the BIG SALES

45,000 metal industry buyers . . . talking, thinking, seeking production-boosting ideas and methods, machines and processes, and the latest technical developments, are a ripe and eager-to-buy audience for your best sales effort. That's the market that'll be ready to spend time with you and your staff at the National Metal Exposition . . . the biggest and finest metal Show in history. If you haven't nailed down your exhibition space, get it done today—because your competitors are doing it. Your share of the major sales started and closed at these great Shows is waiting . . . better wire or phone today for the space you'll need to get those big sales started! Write, wire or phone . . .

NATIONAL METAL EXPOSITION
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7301 Euclid Avenue, Cleveland 3, Ohio
Telephone: UTah 1-0200

NATIONAL METAL CONGRESS

NATIONAL METAL EXPOSITION

WORLD METALLURGICAL CONGRESS

Oct. 15-19 • Detroit, Michigan

Metals Review

THE NEWS DIGEST MAGAZINE

VOLUME XXIV, No. 8 AUGUST, 1951

MARJORIE R. HYSLOP, Editor
RAY T. BAYLESS, Publishing Director
GEORGE H. LOUGHNER, Production Manager

• • •

A. P. Ford, Advertising Manager
7301 Euclid Ave., Cleveland 3, Ohio
UTah 1-0200

Harry L. Gebauer
John F. Tyrrell
District Managers
55 West 42nd St., New York 18
CHickering 4-2713

Ralph H. Cronwell, Western Manager
482 Burton Ave., Highland Park, Ill.
HIghland Park 2-4263

Don Harway, West Coast Rep.
1709 West 8th St., Los Angeles 14
DUnkirk 2-8576

• • •

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WORLD METALLURGICAL CONGRESS

IMPORTANT LECTURES

DEPARTMENTS

ASM REVIEW OF METAL LITERATURE

6th METALLOGRAPHIC EXHIBIT

Rules are simple and few; there are no restrictions as to size or method of mounting, except for entries from overseas. As in the five previous exhibits, the entries will be displayed to good advantage.

CLASSIFICATION OF MICROS

- Cast irons and cast steels
- Toolsteels (except carbides)
- Irons and alloy steels (excluding stainless) in wrought condition
- Stainless and heat resisting steels and alloys
- Light metals and alloys
- Heavy nonferrous metals and alloys
- Powder metals (and carbides) and compacts
- Weld structures (including brazed and similar joints)
- Series of micros showing transitions or changes during processing
- Surface phenomena
- Macrographs of metallurgical objects (2 to 10 diam.)
- Results by non-optical or unconventional techniques.

RULES FOR ENTRANTS

Work which has appeared in previous metallographic exhibits held by the American Society for Metals is unacceptable. Photographic prints shall be mounted on stiff cardboard, each on a separate mount, each carrying a label giving:

Name of metallographer
Classification of entry
Material, etchant, magnification
Any special information as desired

Transparencies or other items to be viewed by transmitted light must be mounted on light-tight boxes wired for plugging into lighting circuit, and built so they can be fixed to the wall.

Exhibits must be delivered between Sept. 20 and Oct. 10, 1951, either by prepaid express, registered parcel post, or first-class letter mail.

Address: Metallographic Exhibit
National Metal Congress and Exposition
State Fair Grounds
Woodward & State Fair Ave., Detroit, Mich.

AWARDS AND OTHER INFORMATION

A committee of judges will be appointed by the Metal Congress management which will award a First Prize (a medal and blue ribbon) to the best in each classification. Honorable Mentions will also be awarded (with appropriate medals) to other photographs which, in the opinion of the judges, closely approach the winner in excellence.

A Grand Prize, in the form of an engrossed certificate, and a money award of $100 will be awarded the exhibitor whose work is adjudged best in the show, and his exhibit shall become the property of the American Society for Metals for preservation and display in the Society's headquarters.

All other exhibits will be returned to owners by prepaid express or registered parcel post during the week of Oct. 22, 1951.

Entrants living outside the U.S.A. will do well to send their micrographs by first-class letter mail endorsed "May by opened for customs inspection before delivery to addressee". To meet regulations of the international mails, size of mount must be no larger than 14 x 18 in.

WORLD METALLURGICAL CONGRESS
33rd NATIONAL METAL CONGRESS AND EXPOSITION

DETROIT, MICH. **OCTOBER 15 to 19, 1951**

WASHINGTON SUPPORTS W. M. C.

World Metallurgical Congress Receives Cooperation of Major Governmental Agencies in Plans for Unprecedented International Scientific Gathering

OFFICIAL Washington accords full support to the World Metallurgical Congress. Following a recent trip to the Capital, William H. Eisenman, secretary, American Society for Metals, reports a "growing interest in this first free-world conclave on metal resources and their conservation.

"Major governmental agencies are cooperating in an effort to assure world-wide acceptance and knowledge of the event. It is gratifying to think that the American Society for Metals is sponsoring an international gathering that is regarded with such significance," said Mr. Eisenman.

From the White House to the Capital, the World Metallurgical Congress is being discussed. Cabinet members, congressional committee chairmen, senators, congressmen, heads of departments and scientific boards are familiar with the story.

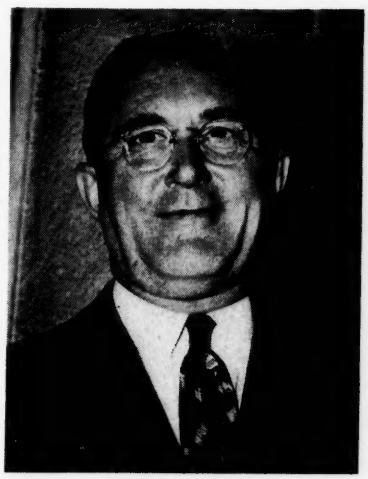
There is unanimity in feeling that the World Metallurgical Congress will contribute greatly to stronger international ties during the present period of defense preparation for a more durable and secure peace.

Joining with the Economic Cooperation Administration and its "technical assistance program", and the Office of Defense Mobilization—the two government agencies first to support the idea of the World Metallurgical Congress—are the following:

State Department—From the beginning help has been extended in sending invitations to metal-minded free countries through their ambassadors and attaches resident in Washington. U. S. embassies abroad have also given aid.

Recently a plan was initiated to bring visitors to W.M.C. under Point Four auspices. Thus various countries outside the OEEC-ECA sphere will have scientific representation at the Congress. Also, the State Department is assisting in the matter of passports and security clearance, and is cooperating with embassies in Washington by planning diplomatic receptions for the respective conferees during their three-day visit to the National Capital. An estimated 400 conferees are now expected from 21 nations.

Commerce Department — Help in furnishing lists of foreign companies and trade associations likely to be interested in receiving bids to the World Metallurgical Congress came from "Commerce". Active aid also has been extended in developing potential exhibits by overseas metal firms at the National Metal Exposition. Secretary of Commerce Charles Sawyer is watching progress with interest.



Defense Mobilizer Charles E. Wilson has accepted the invitation of the American Society for Metals to be the major speaker at the closing session of the World Metallurgical Congress in Detroit on Oct. 19. Mr. Wilson will speak on the strategic importance of world metal conservation and production to the interests of free world defense. (NEA Service)

Circular airgrams have gone to all American Consulates publicizing the World Metallurgical Congress among interested concerns. *Foreign Commerce Weekly,* with an international circulation of some 20,000, has carried stories in recent issues.

Interior Department — With Dr. James Boyd, director of the Bureau of Mines, and Defense Minerals Administrator, serving as official W.M.C. liaison, the interest and support of Secretary of the Interior Oscar L. Chapman has developed to such an extent that the message of the Congress was conveyed by him to President Harry S. Truman.

Dr. Boyd is scheduled to address the conferees in Detroit on the subject of metal resources. He will speak at the opening meeting to be held Sunday evening, Oct. 14, at the Statler Hotel.

Office of Defense Mobilization—Director Charles E. Wilson's acceptance of the invitation to be the principal speaker at the farewell banquet of the World Metallurgical Congress in Detroit on Friday, Oct. 19, reveals his support and demonstrates his belief that W.M.C. is vital to the unification of world-wide defense production efforts.

Also significant is the appointment late in July of Dr. Oliver Buckley as liaison between W.M.C. and the Office of Defense Mobilization. Dr. Buckley, chairman of the board of Bell Telephone Laboratories, is serving in Washington as chairman of the Science Advisory Committee of the O.D.M. "He is a most logical and happy choice for this important responsibility," said Dr. Zay Jeffries, director-general of the World Metallurgical Congress.

Defense Department — Names of eminent prospective scientific conferees to W.M.C. have been suggested to the American Society for Metals by this agency. Invitations urging them to attend and contribute to the important exchange of ideas on the subject of conservation and more efficient utilization of metals and minerals—the underlying theme of the Congress—have borne fruit.

Secretary of Defense, General George C. Marshall, has extended his best wishes for the success of W.M.C.

National Research Council — Arrangements initiated by Dr. Jeffries with the National Research Council of the National Academy of Sciences, top scientific arm of the government, have placed the World Metallurgical Congress upon the official Government-approved list of scientific meetings worthy of full support by the United States in terms of the contribution made especially in the field of international scientific relations.

The National Bureau of Standards has expressed willingness to receive delegations of conferees upon the occasion of the Bureau's 50th Anniversary being celebrated this year. Individual study tours of the research laboratories and a general meeting at the Bureau of Standards are contemplated.

The Congress of the United States is likewise giving attention to the arrival of the distinguished metal scientists. Now under consideration before the House Foreign Affairs Committee is a proposed Joint Resolution "recognizing and welcoming the World Metallurgical Congress".

Introduced through the interest

(*Continued on page* 6)

W. M. C.—*(Cont. from p. 5)*
and courtesy of Joseph W. Martin, Jr., Congressman from Massachusetts and minority leader, the resolution has been assured the support of many from both House and Senate. Congressman George H. Bender of Ohio has guided the resolution on its way.

Voice of America—The Voice of America has beamed the story of W.M.C. across Europe and is planning additional broadcasts, one of which will take place from Detroit during the scientific sessions in October. Theme of these broadcasts was and will be the opportunities for an exchange of ideas among men of top scientific level.

Three New Groups Add 100 Conferees to Foreign Scientists in Detroit

Three new groups of foreign scientists and engineers engaged in metallurgical operations and fabrication have been added to the eight groups originally comprising the conferees to the World Metallurgical Congress.

Totaling just under 100 additional visitors, the three groups will be concerned respectively with nonferrous heavy metal fabrication (to be designated as W.M.C. Group No. 7), galvanizing techniques (W.M.C. Group No. 11), and nonferrous smelting and refining (W. M. C. Group No. 12). The additional conferees will bring the total to some 400 foreign scientists in 12 subject groups.

These new groups will attend the World Metallurgical Congress at the invitation of the American Society for Metals as members of three "technical assistance missions" sponsored by the Economic Cooperation Administration. They will arrive in Detroit on Sunday, Oct. 14, and spend the ensuing week attending the sessions of the National Metal Congress and World Metallurgical Congress and inspecting the National Metal Exposition. Their headquarters (together with all of the other conferees to the World Metallurgical Congress) will be at Detroit's Hotel Tuller.

At the end of the Metal Congress these three groups will proceed on four-week plant tours in their respective fields of interest so that they may have an opportunity to study American production methods. These tours will be similar in nature to the study tours that the other eight groups participating in the World Metallurgical Congress will have taken prior to the week in Detroit. As previously announced, subjects for these eight tours will be steelmaking and refining; nonferrous refining and fabrication; ferrous fabrication; heat treatment; welding and joining; inspection and testing; research (private, industry and government bureaus); and education (engineering societies and universities).

The three groups on nonferrous smelting and refining, nonferrous heavy metal fabrication, and galvanizing techniques will be under the direction of the Metallurgical Research & Development Co., Inc., Washington, D. C.

The other eight tours are being organized and directed by the American Society for Metals, W. H. Eisenman, executive secretary.

A. S. M. Annual Meeting

To the Members of the A.S.M.:

This is your official notice that the annual meeting of the American Society for Metals will be held in the Statler Hotel, Detroit, on Wednesday morning, Oct. 17, 1951. All members of the Society in good standing are privileged to attend and vote.

W. H. EISENMAN, Secretary

Cleveland, Ohio
August 1, 1951

Carpenter Promotes Three As B. H. DeLong Retires

George V. Luerssen, formerly chief metallurgist of Carpenter Steel Co., has been appointed vice-president in charge of metallurgy by the board of directors. He succeeds B. H. DeLong, who announced his retirement as vice-president and technical director after 41 years of continuous service. Mr. DeLong will continue as a member of the board of directors.

Carl B. Post will succeed Mr. Luerssen as chief metallurgist, and George E. Brumbach, a member of the metallurgical department at Carpenter Steel since 1933, advances to the position of metallurgist to succeed Mr. Post.

All three men are members of A.S.M. Mr. Luerssen has served on several A.S.M. national committees, and has twice been honored by local chapters. In 1945 he received the Bradley Stoughton Award of the Lehigh Valley Chapter, and in 1949 the David F. McFarland Award of the Penn State Chapter.

Armco Adds New Equipment

Construction has begun on a $2,000,000 project to increase the production of electrical steel at the Butler, Pa., division of Armco Steel Corp., according to announcement by W. W. Sebald, president.

A battery of new annealing furnaces is being constructed, and equipment is being added to process this special type of steel. In addition, new shears are being installed and the shipping facilities of the plant are being increased.

THIRTY YEARS AGO

A paragraph in a paper by National President A. E. WHITE in the June 1921 issue of the *Transactions* of the American Society for Steel Treating calls attention to a project destined to culminate in one of the indispensable tools of the profession —the S.A.E. steels. He says, "The Society for Automobile Engineers is today engaged in a splendid piece of standardization along the lines just pointed out as being so badly needed. It is trusted that they may continue to make the progress which has been so auspiciously started."

— 30 —

The fourth honorary member of the Society was announced that same year with the election of Prof. EDWARD DEMILLE CAMPBELL,† famed blind professor at University of Michigan, in whose honor the Campbell Memorial Lecture was later established.

— 30 —

A new chapter was established in Worcester, Mass., in May 1921. First chairman was VICTOR E. HILLMAN, metallurgist, (now director of research), Crompton & Knowles Loom Works.

— 30 —

Chapter reports indicated a high interest in the subject of "Fatigue of Metals" as presented by Prof. H. F. MOORE of University of Illinois in St. Louis, Milwaukee, Tri-City, Northwest and many other centers. Professor Moore was in the midst of his classical studies conducted under the auspices of the National Research Council, Engineering Foundation, and Experimental Station at the University.

— 30 —

"New Members" in June listed JAMES O. LORD of Gary, Ind. (longtime associate professor at Ohio State University, and a leader in A.S.M.-sponsored educational projects).

— 30 —

The magazine *Chemical & Metallurgical Engineering* takes advertising space in the *Transactions* to announce a series of articles by JEFFRIES and ARCHER on "Crystalline Structure of Metals", which later formed a part of their famed text on "Science of Metals". The series, the ad states, "will include the first presentation of Dr. Jeffries' revolutionary theory ascribing hardening of metals to slip interference".

— 30 —

A note of alarm creeps into an editorial in the June issue. In that period of postwar recession only 89 of the country's 436 blast furnaces were in operation, the editorial states. Nevertheless, production of alloy steel ingots and castings was the second highest on record.

† Now deceased.

New York Completes Educational Series On Metal Processing

A series of six lectures on "Practical Metal Processing" was given by outstanding experts in their respective fields as the 1950-51 educational series of the New York Chapter A.S.M.

"Casting" was the subject selected to open the series, with Donald Sawtelle of Malleable Iron Fittings Co. as guest speaker. The increased importance of mechanization in the foundry was stressed. Great advances in the past 20 years far surpass the improvements made in the previous hundred years of the foundry industry, the speaker asserted. A major advance has been the development of ductile iron using magnesium or cerium additions for structure control.

The second lecture, on "Hot Working" was given by John H. B. Anderson, resident metallurgist of U.S. Steel Co. in New York. The significance of the iron-carbon diagram was emphasized. Steel in the austenitic condition is more readily shaped, since tensile strength is only 5 to 10% of room-temperature value. Because grain directional properties are produced in hot working, impact strength, reduction of area and elongation are improved, whereas tensile strength and yield strength are relatively unaffected.

Felix Aloi, metallurgical engineer of Bethlehem Steel Co., presented the third of the series on "Cold Working". The function of 3, 4 and 5-high tandem-type mills in relation to thickness or gage and finish was detailed. The development of the industry is highlighted in the speed of modern cold rolling mills which can turn out strip at rates up to a mile a minute.

The fourth talk, on "Forming" was presented by Emilio Andreola, sheet metal methods leader of Sperry Gyroscope Co. Examples of all phases of sheet metal products were shown and the specific problems involved with each part were discussed. Parts formed in aluminum and its alloys, copper, brass, beryllium-copper, low-carbon steel, and austenitic steel were shown. Operations illustrated ranged from simple blanking and bending to complex deep drawing and precision punching.

"Joining" was the subject of the fifth lecture, given by David Swan, metallurgical engineer of Union Carbide and Carbon Research Laboratories. The invention of the oxy-acetylene torch solved the problem of sufficient heat where it is most needed, the speaker said, after tracing the history of soldering, brazing and welding. A great improvement in electric arc welding is the control of atmosphere in the region of the weld by use of a stream of helium or argon about the flame or submerging the weld area under a blanket of suitable flux as in the Unionmelt process. The properties desired in the weld determine the material used, while capital and operating costs determine the method employed.

The sixth and final lecture was given by Eugene Merchant, senior research physicist of Cincinnati Milling Machines, Inc. Recent research on the mechanism of chip formation was reviewed in detail, and the speaker showed the relation of tool angles to chip formation and to speed of machining. The data shown were based on work done with Timken 16-25-6 alloy.

Flame Hardening Advantages Shown

Milton Garvin (Center), Speaker at a Recent Meeting of the Indianapolis Chapter), Demonstrates a Flame Hardened Part. At left is Carl Sundberg of Diamond Chain and Mfg. Co., chapter secretary; and at right is John Mitchell, Indianapolis Naval Ordnance Plant, Chapter chairman

Reported by John C. Wagner

Head, Metallurgical Branch
Indianapolis Naval Ordnance Plant

Advantages incurred in heat treating by the flame hardening method, and modern equipment now available for the process, were explained to the Indianapolis Chapter A.S.M. in April by Milton Garvin, then representing the Cincinnati Milling Machine Co.

This method leads to only a small amount of distortion, is very rapid, and the cost is low compared to other processes, the speaker pointed out. Until recently, the problems of confining the heat to the area to be hardened and of controlling the temperature were not solved, and therefore the uses of flame hardening were considerably limited.

Now an electronically controlled machine has been developed by the Cincinnati Milling Machine Co. which has successfully overcome these difficulties. Surface temperature is accurately measured and controlled by a sensitive thermopile. In some instances surface temperature can be raised 500° F. in 1 sec.

Mr. Garvin stated that in one plant the services of two men and three selective hardening machines were formerly required to harden 67 cam rings per hr. Flame hardening requires only one man and one machine, and production is now 350 cams per hr. Manufacturers of parts ranging from small calculating machine gears to large diesel crankshafts are finding that flame hardening is the answer to many of their heat treating problems.

Fatigue of Metals Not Fatiguing

Reported by G. A. Stemple

Consolidated Gas, Electric, Light & Power Co.

That fatigue of metals need not be a fatiguing subject was demonstrated by Oscar J. Horger of the railway division, Timken Roller Bearing Co., at the Baltimore Chapter meeting on April 16. Dr. Horger, discussing "What The Metallurgist Should Know About Design", emphasized that the shape of a part, more often than its metallurgy, determines its failure under fatigue stresses. Dr. Horger's thoughts on this subject have been outlined previously in *Metals Review.*

Dr. Donald Pritchard, director of the Chesapeake Bay Institute, presented the workings of that institution in the coffee talk.

Story of Canada's Aluminum Industry Includes Travelog

Reported by John Bradbury
Metallographer, Algoma Steel Corp., Ltd.

The story of "Canada's Aluminum Industry", presented before the Northern Ontario Chapter A.S.M. in April, was complemented by an excellent travelog. The speaker, I. S. Decarie, director of information, Aluminum Co. of Canada, conducted his listeners on a tour of British Guiana, Trinidad and Greenland, ending in Arvida, Quebec, home of the largest aluminum plant in the world.

Aluminum is produced by the reduction of its oxide. The most common ore of aluminum is bauxite, which is a mixture of aluminum oxide, together with oxides of iron, silicon and titanium as impurities. The bauxite is mined by the open-pit method in British Guiana and 4 lb. is required to produce 1 lb. of aluminum. The bauxite is carried by shuttle boats to a trans-shipping station at Port of Spain, Trinidad.

From here, Mr. Decarie took his audience to Greenland, where cryolite—a necessary constituent in the reduction process—is obtained. Greenland is the only known source of cryolite and the supply is diminishing rapidly. However, cryolite can be synthesized on a commercial basis and thus the future of this process is secure.

Fluorspar is obtained from Newfoundland, while petroleum coke is brought in from Texas.

All these raw materials arrive at Port Alfred, Quebec, and travel by rail to Arvida. In the reduction process at the plant of Aluminum Co. of Canada, the aluminum oxide (alumina) which has been produced after a chemical treatment of bauxite to remove the impurities, is decomposed into metallic aluminum and oxygen in an electrolytic cell lined with carbon and containing a bath of molten cryolite. The oxygen of the aluminum oxide, after dissociation, reacts with the electrode to form oxides of carbon, while the molten aluminum collects at the bottom of the pot and is periodically tapped and passed through holding furnaces for blending and freeing from cryolite inclusions.

This metal is then cast into ingots. Its aluminum content is over 99.5%, with iron and silicon as the main impurities. Such ingots (weighing about 48 lb.) are of commercial purity because the impurities are inherent in the process of extraction.

Seven tons of raw material, plus electrical energy equivalent to 16 tons of coal, are necessary to produce one ton of aluminum.

The ingots are shipped from Port Alfred. Canada uses only 15% of the total production. While the United Kingdom absorbs most of the remainder, a considerable amount is also shipped to the U. S. and about 30 other countries.

The town of Arvida was portrayed with excellent colored slides, showing homes and schools as well as the plant itself.

At London Meeting

N. C. Fick, Metallurgist, Research and Development Board, and R. W. Blount of the British Ministry of Education Chat at the Dorchester Hotel on May 30 During the Annual Meeting of the Iron and Steel Institute in London. Mr. Fick was in England on a special metallurgical mission for the Research and Development Board. Dr. Blount plans to attend the World Metallurgical Congress in Detroit next fall.

Defines Machinability For Production Men On Basis of Tool Life

Reported by John C. Wagner
Head, Metallurgical Branch
Research and Test Department
Indianapolis Naval Ordnance Plant

Defining machinability of a material as the number of pieces that can be cut until dulling of the tool occurs, Norman Zlatin of Metcut Research Associates pointed out that production men are generally concerned with this phase of machining. Mr. Zlatin addressed the Indianapolis Chapter A.S.M. on May 21 on some metallurgical aspects of machining cast iron, steels, and high-temperature alloys, and pointed out the correlation between microstructure and machinability.

Gray cast iron represents an interesting case since a wide variety of microstructures may be obtained with this material. Slides were presented showing seven typical structures common to gray cast iron, such as ferrite and graphite, coarse pearlite and graphite, rapidly chilled white iron (non-machinable), etc. Tool life obtained within this range may vary as much as 50 to 1.

A single casting such as a motor block may contain a number of these structures. The thick cylinder wall will cool slowly and hence may consist of a coarse pearlitic structure, while the flash on the edge of the holes might be white iron and therefore unmachinable.

The low-carbon steels contain ferrite as the chief constituent along with some pearlite. The former is soft, while the latter is somewhat harder. The free-cutting steels owe their superior machinability to the addition of sulphides, selenides, or lead. The carburizing steels are prone to banding, and this may be avoided by cycle annealing. The medium-carbon alloy steels may have any one of a wide variety of microstructures, which should be considered in setting up machining operations.

Mr. Zlatin stated that surprisingly little has been done to apply metallurgical knowledge for the betterment of machining conditions. He closed his talk by repeating that the microstructure of a metal plays an important part in determining how many pieces can be machined before the cutting tool becomes dull.

New Chapter Organized In Pacific Northwest

A new chapter of the American Society for Metals has been organized in the Pacific Northwest. Known as the Columbia Basin Chapter, it will center in Richland, Wash. Its organization resulted from the realization that a sizable number of A.S.M. members, most of them affiliated with either the Puget Sound or Inland Empire Chapter, reside in the Richland area.

Organization of the chapter was stimulated largely by George L. Flint, who is on the metallurgical staff of the General Electric Co. in Richland. Mr. Flint also assisted in organizing the Oak Ridge Chapter of A.S.M. a few years ago. The petition for a chapter was signed by 24 A.S.M. members, and 11 new members in the Richland region have since joined the Society.

An organizational meeting is planned for sometime during September, when the charter will be presented to the chapter. A proposed chapter constitution has been drawn up and submitted to the membership for ratification.

Tentative chapter officers consist of George L. Flint, chairman; Blair R. Elder, secretary; R. S. Dalrymple, treasurer; and O. J. Wock, vice-chairman. On the tentative executive committee are Ray Ward, R. G. Wheeler, L. D. Turner, J. M. Fox, Jr., and J. V. McMaster.

Los Angeles Honors Old-Timers

Officers, Speakers, and Some of the Old-Timers and Sustaining Member Representatives Grouped for a Picture at the May Meeting of the Los Angeles Chapter. From left are Howard N. Farmer, Jr., chief metallurgist of Security Engineering Co., one of the speakers; W. J. Parsons, retiring secretary-treasurer; Wm. E. DeRidder, chairman of the board, General Metals Corp.; Otto Hammer, president of Security Engineering Co.; J. A. Chalk, Jr., metallurgical engineer, Bethlehem Pacific Coast Steel Co.; and C. D. D'Amico, retiring chapter chairman

Reported by C. E. Levoe
Welding Engineer, Menasco Mfg. Co.

Los Angeles Chapter, in its last meeting of the season, celebrated Old-Timers' and Sustaining Members' Night. Many of the old-timers present were founder members of the chapter. New officers were also elected and installed.

The technical program was divided into two portions, with Otto Hammer, president of Security Engineering Co., giving a resume of the growth and use of alloy metals in the oil tool industry, and H. N. Farmer, Jr., chief metallurgist of Security Engineering, speaking on the extraordinary demands placed on metals by oil well drilling.

The oil tool industry is now next only to the automobile and railroad industries in its consumption of steel, the speakers pointed out. Until about 1912 no metallurgy was involved in producing drilling equipment except that supplied by the blacksmith. With the drilling of deeper wells, the metallurgist was called upon to provide new and stronger metals to meet the increased demands.

The first change in the use of steel was a shift from carbon to alloy steels. Later the alloy steels were heat treated, and now practically all oil tool equipment receives special heat treatments to meet a wide variety of conditions.

In the oil tool industry the metallurgist must meet a challange not often imposed. In most industries, the metallurgist provides the materials and the designer then makes the parts sufficiently large to withstand the loads. In the oil tool industry, on the other hand, where a limited amount of space is available, the designer outlines the equipment and the metallurgist must then find materials to make the parts work.

Steels must be provided not only with very high strength but also with high toughness, and in many applications abrasion resistance, impact strength and high torsion strength are critical factors.

The recent emergency has created additional problems for the metallurgist. Much effort is being devoted to finding substitute steels using less of the critical elements but still meeting the stringent requirements of the oil drilling industry.

"Heat Balance" Method Used in Cutting Tests

Reported by Arthur C. Willis
Magnaflux Corp.

The important question in metal cutting, said A. O. Schmidt, addressing the North Texas Chapter on May 16, is always "What is going on at the cutting edge?" Mr. Schmidt, who is research engineer with Kearney & Trecker Corp., spoke on "Theory and Practice of Metal Cutting."

The speaker described the "heat balance" method used in his laboratory, in which either drilling or milling operations are conducted under water, while the torque, horsepower, and heat generated are measured.

High cutting speed causes extra heat in the tool, not in the chip or work piece, Mr. Schmidt emphasized. Furthermore, when speed is excessive, there is a progressive change in chip shape as the tool wears. Since too low a speed can cause excessive tool wear also, there is an optimum speed for maximum tool life.

Rake angle has little effect on surface finish, Mr. Schmidt pointed out, finish being better with higher speeds and light cuts.

Lubrication does not reduce the power requirements, except in those operations which involve much friction (such as drilling). However, in all operations it will reduce the temperature of the tool, and hence reduce wear. The application of heat externally to the work piece has merit in that it reduces the power requirement on the machine tool.

Outstanding Advances In Powder Methods of Molybdenum Production

Reported by Peter Patriarca
Metallurgy Division
Oak Ridge National Laboratory

"Powder metallurgy, formerly an art, rapidly becoming a science, can certainly anticipate a spectacular future." This statement concluded an educational and informative talk presented by Jack Kurtz before the members of the Oak Ridge Chapter on April 11.

Mr. Kurtz, co-owner of the Kulite Tungsten Co., Union City, N. J., briefly covered the fundamentals and history of powder metallurgy before proceeding to discuss the preparation, fabrication, properties, and application of the refractory metals and their alloys. The talk was supplemented with a varied display of powder metallurgical products. In addition, Mr. Kurtz presented slides showing equipment, photomicrographs of powder compacts at various stages of fabrication, and flow sheets describing the numerous and frequently complex steps required to produce a hot worked ingot starting from the native ores.

After describing the preparation by powder metallurgy methods of tungsten and some of its alloys, Mr. Kurtz outlined recent outstanding advances made in the production of molybdenum. Whereas 10-lb. ingots of electric resistance sintered molybdenum were once considered substantial, present-day arc melting techniques used by the Climax Molybdenum Co. can yield 1000-lb. ingots. One of the major problems is the control of carbon and oxygen, which exert profound effects on workability.

An interesting sidelight was Mr. Kurtz's description of a method for preparing molybdenum tubing. Molybdenum powder is pressed on a slightly tapered steel mandrel and sintered in situ. Hot swaging of the unit as a whole is followed by a drawing operation during which the steel core is removed. Several lengths of 0.10-in. o.d. tubing with a 0.020-in. wall were displayed.

Prior to Mr. Kuntz's talk, Arthur Focke, past president of A. S. M., reported on the events and activities at the Western Metal Show at Oakland, Calif. He also announced the coming World Metallurgical Congress in Detroit, which, combined with the annual National Metal Congress and Exposition, promises to be the greatest A. S. M. show on earth.

Physical Chemistry A Powerful Tool For Metal Industry

Reported by B. R. Price
Westinghouse Electric Corp.

Considerable prejudice still exists in some quarters to the application of thermodynamics to many metallurgical problems, despite the fact that the beginnings of this work go back more than 60 years. The reason in part can be traced to many cases of misapplication of principles and use of poor data, according to James B. Austin, director of research, U.S. Steel Corp. Research Laboratories.

Dr. Austin addressed the May meeting of the Pittsburgh Chapter A.S.M. on "Application of Physical Chemistry in the Metals Industry".

There are two broad divisions in this field, the speaker said,—namely, studies of equilibrium conditions and studies of reaction rates. He then explained the meaning of some of the terms used in equilibrium calculations.

The total energy of a substance is made up of two parts, the *bound* and the *free part*. The bound part is related to relative positions of its molecules and to their random motion, which increases with temperature. The energy contained in the random motion of molecules is related to *entropy*, and the product of temperature and entropy is known as *thermal energy* characteristic of the substance.

A similarity between thermal energy and electrical energy exists in which the quantity factors are entropy and ampere-seconds respectively. The potential factors are temperature and volts. For most reactions it is the *free energy* which is important—or, more correctly, the change in free energies.

Physical chemists also use the term *activity* to describe the thermodynamic concentration of substances entering into reaction. This term can be mathematically manipulated in the same manner as other terms in thermodynamic expressions. The calculation of equilibrium constants is the cheapest way to check possible reactions.

As an example of the usefulness of thermodynamic calculations in a commercial process, the speaker reviewed the important blast furnace reactions with particular reference to equilibrium conditions prevailing between mixtures of CO and CO_2 and different oxides of iron and iron itself. When these equilibrium conditions are considered in conjunction with the total heat available and heat available in hearth and in bosh zones, one can obtain information regarding the relative efficiency of utilization of coke.

Dr. Austin mentioned the well-known work of Chipman and others in applying equilibrium data to the openhearth deoxidation process. Other branches of metallurgy to which these types of calculation have been applied are refractories, phase diagrams, many gas-metal reactions, tarnish and film studies, and diffusion.

The other broad classification of physical chemistry—reaction rates—has not been as fully explored.

Rates of reaction are affected by chemical factors (such as temperature, pressure, composition, and presence of catalysts), while the rate of mixing and rates of transporting one reactant to another are affected by physical factors (such as particle size, turbulence, etc.).

Recent studies have shown that the rate of the desulphurizing reaction in the blast furnace may be much slower than was hitherto realized and hence is of commercial interest. There are many other examples in smelting and refining where slag-metal reactions are determined in large part by the behavior of the interface between slag and metal.

The speaker closed by stating that physical chemistry is a powerful tool in solving many problems when properly applied. It is a field of science which will bear watching closely in the future by all persons connected with metallurgical processes.

Above: Dr. Austin Addressing the Pittsburgh Chapter's May Meeting

New Professorship Established

A new professorship in metallurgical engineering has been established at Carnegie Institute of Technology through a grant from the Jones & Laughlin Steel Corp., according to a joint announcement by Carnegie President J. C. Warner and Admiral Ben Moreell, president of Jones & Laughlin.

The new chair, supported by a grant of $15,000 per year, will be held by Gerhard J. Derge, professor of metallurgical engineering and a staff member of Carnegie's Metals Research Laboratory. Part of this sum will be used for research and equipment. The new chair will be named the Jones & Laughlin Professorship in Metallurgical Engineering.

Past Chairmen at the May Meeting of the Pittsburgh Chapter, Clockwise Around the Table Starting With Left Foreground: James P. Gill, Vanadium-Alloys Steel Co.; Harold T. Clark, Jones & Laughlin Steel Corp.; Stephen L. Goodale, University of Pittsburgh; W. I. McInerney, Crucible Steel Co. of America; L. W. Oswald, U. S. Steel Co.; Charles F. Pogacar, Koppers Co.; G. A. Roberts, Vanadium-Alloys Steel Co.; Howard Scott, Westinghouse Electric Corp.; L. C. Whitney, Copperweld Steel Co.; and F. H. Allison, Jr., United Engineering and Foundry Co. (Reported by C. T. Haller, Metallurgist, International Nickel Co., Inc.)

Advantageous Features of Two Methods Combined In Marform Process

Reported by G. A. Stemple
Consolidated Gas, Electric, Light & Power Co.

"Marform, the New Metal-Forming Process" was the subject of a lecture by Henry P. Hessler before one of the spring meetings of the Baltimore Chapter A.S.M. Mr. Hessler, a co-inventor of the process, is manufacturing sales engineer in the commercial sales department of the Glenn L. Martin Co.

Mr. Hessler clarified the features of the Marform process by reviewing two of the metal forming methods which preceded it, namely, steel die drawing and the Guerin or conventional rubber-pad process. The Marform process has combined the best features of both these processes, retaining the accurate forming ability of a steel die with the economic tooling of the rubber-pad method.

The upper part of the machine consists of a steel retainer head containing layers of rubber; the lower part includes a portion of the hydraulic system, a bolster plate for supporting the form tool, pressure pins and a seal ring.

A flat metal blank is placed on top of the punch and blank holder, and the forming cycle started by lowering the rubber pad and holder until the sealing ring is encompassed. After sealing, the downward-moving rubber contacts the blank, and additional pressure forces the outer portion of the blank and blank ring downward until sufficient depth of draw is obtained. On the return stroke, the rubber pad and holder are raised first, then the pressure pins raise the holder ring and blankholder plate, thus stripping the finished part from the punch.

Mr. Hessler pointed out that the rubber pad, when completely confined, behaves very much like any fluid, having a compressibility at varying pressures from 0.25% to 3%.

A reduction of 40% in diameter is probably normal when forming aluminum alloys on a steel die, with 50% a maximum. By comparison, 57% is considered normal when Marforming, with 70% possible in some cases. The depth of cup possible in one operation is equally in favor of the Marforming process; thus, frequently, one operation will form a part that would otherwise require two operations.

The coffee talk "Photographic Study of Wild Life in Kruger Park, South Africa" was presented by E. T. Clayton, president, Tainton Co.

Ladies Entertained by Lecture on Fabrics

Reported by A. Floyd Whalen
Metallurgist and Chemist

York Chapter held its 19th Ladies Night at Allenberry, near Carlisle Pa., on Saturday June 9. The evening started with an enjoyable dinner, after which Miss Katrina Conway assistant director of consumer information for the Celanese Corp., spoke on "Color Coordination for the Wardrobe and Home".

While Celanese is hardly in the dominion of metallurgy, it proved interesting to the ladies and further enhanced the value of an A.S.M. membership in providing one further bit of knowledge in exchange for the annual dues.

After the lecture, dancing continued until 1:00 a.m., interspersed with entertaining skits from the orchestra and periodical drawings for door prizes.

Visits British Industries As Marshall Plan Expert

J. Walter Gulliksen, chairman of the Worcester Chapter, American Society for Metals, flew to England on June 25, for a visit to the British metal stamping industry. As a member of a Marshall Plan group of 15 selected from leading stamping companies of the United States, his mission was to furnish technical assistance to the industry, with a view toward increasing productivity.

Mr. Gulliksen planned to contact British technical societies, and also to visit plants of Vauxhall Motors, Briggs Motor Bodies, Pressed Steel Co., Fisher & Ludlow, Joseph Lucas; Rubery, Owen & Co.; Nuffield Metal Products, Joseph Sankey & Sons, E. Samelinat & Co., Morris Radiators, Frigidaire, and E. M. I. of Hayes, Middlesex.

Mr. Gulliksen is general superintendent of the Worcester Pressed Steel Co. He planned to return to the States early in August.

Electromet Expands Plants

When its big expansion program is completed in 1953, Electro Metallurgical Co. will have increased its ferro-alloy capacity more than 200% over the 1940 level. New construction by Electromet, a division of Union Carbide and Carbon Corp., includes work now going on at the company's newest plant at Marietta, Ohio, and at other plants in Ashtabula, Ohio, and Portland, Ore. Expenditures will amount to approximately $135 million. When the Marietta plant is completed, Electromet will have nine alloy-producing plants.

Factors That Govern Flow of Metal in Deep Drawing Listed

Reported by J. P. Simpson
Chief Chemist, Canadian Car & Foundry Co., Ltd.

The pressed metal industry of today is the machine-age version of the beater's art, according to J. W. Lengbridge, project engineer, Aluminum Goods Limited, Toronto. Mr. Lengbridge addressed the Montreal Chapter A.S.M on April 2 on "Metal Flow in Deep Drawing Operations on Aluminum."

Where formerly metal was slowly shaped over wooden forms with crude tools by expert craftsmen, today by merely pressing a button or moving a lever a modern press comes to life in a matter of seconds. The flat metal blank passes automatically through a series of stretching, forming and bending cycles causing the metal to flow in controlled directions resulting in a product free from wrinkles, fractures and surface defects.

Many factors must be taken into consideration in metal flow. The speaker described ably the flow of metal in circular shells, the proportionality of flow to diameter reduction, progressive shape changes, and changes in properties caused by cold work.

Shape Determines Draws

In producing rectangular shells and irregular shapes, the number of draws necessary is more a question of proportion rather than reduction. If the ratio of depth to corner radius if greater than 6, more that one draw is necessary. Another method is to multiply the radius by 4 or 5 and divide this result into the shell depth. This gives some indication of the number of draws that may be required. It was stressed, however, that this is more or less a rule of thumb which may be modified or extended by the effect of other factors involved. Some of these factors are size, proportion, metal thickness, temper, and bottom corner radius.

Progressive shape change, overall shape change, thickness change, change in properties due to cold work, uncontrolled flow in rectangular shells were each dealt with in a manner that displayed the speaker's versatility and knowledge of this old yet ever new art.

Through the courtesy of the Aluminum Co. of Canada, Ltd., a movie "Drawing, Stretching and Stamping" was shown and much appreciated. The talk by Mr. Lengbridge was profusely illustrated with slides and several tables were required to display the many examples of this renowned art.

Inland Empire Officers Installed

Clayton O. Matthews, Retiring Chairman of the Inland Empire Chapter A. S. M., Presents the Gavel and Gong to Lawrence J. Barker, Chairman for 1951-52. Barker is metallurgist at Kaiser Aluminum and Chemical Corp.'s Trentwood rolling mill, and Matthews is metallurgist at Kaiser Aluminum's Division of Metallurgical Research. Seated at the table are Karl T. Aust and R. E. Peterson, two of the speakers; Walter Flatow, engineer with the Columbia Electric Co., who was installed as secretary - treasurer; and F. Rolf Morral, a third speaker. Not shown is Servet A. Duran, professor of physical metallurgy at State College of Washington, who took office as chapter vice - chairman

Reported by David L. Edelman
Kaiser Aluminum & Chemical Corp.

"Industrial Uses of X-Ray Diffraction Methods" was the topic presented at the annual meeting of the Inland Empire Chapter, which also featured installation of officers. The program was presented in three parts by F. Rolf Morral, head of the X-ray diffraction department, division of metallurgical research, Kaiser Aluminum and Chemical Corp., and his two colleagues, Karl T. Aust and R. E. Peterson.

Dr. Morral gave the history of X-ray diffraction in metallurgy and pointed out newer developments in diffraction equipment and techniques —such as electron and neutron diffraction—which are expanding the submicroscopic study of metals.

Dr. Aust's talk covered the use of X-ray diffraction patterns in such metal studies as age hardening, equilibrium diagrams, plastic deformation, and recrystallization.

Mr. Peterson illustrated several uses to which X-ray diffraction is being put in the Kaiser Aluminum research projects. He explained how this medium is used for the identification of materials and for the study of crystal orientation and structure of Kaiser Aluminum alloys as affected by different production practices.

Kahles Now With Metcut

John F. Kahles, formerly associate professor of metallurgical engineering, University of Cincinnati, is now a partner with Metcut Research Associates, Cincinnati, associated with Michael Field and Norman Zlatin. The firm is engaged in research, testing and consultation in metallurgy and machining.

Dr. Kahles is a past chairman of the Cincinnati Chapter A.S.M. and also a past chairman of the Society's National Educational Committee. He still maintains a connection with the University of Cincinnati as research associate in the graduate school.

Substitutes Suggested for Nickel in Stainless Steels

Reported by Thomas S. Simms
Research Information Service
John Crerar Library

The necessity for conserving alloying elements was stressed by V. N. Krivobok in an address before the Chicago Chapter A.S.M. in April on "Current Developments in Stainless Steel". Dr. Krivobok, who is head of the stainless steel section, development and research division, International Nickel Co., told how manganese, nitrogen, copper and tantalum can be used in place of nickel for austenitizing stainless steels.

Methods have been developed by which the mechanical properties of austenitic stainless steels can be materially improved, he continued. Marked changes in the properties of stainless steels were noted when they were subjected to mechanical working below room temperature. The process known as "subzero rolling" produces a material with a different ratio of yield strength to tensile strength and tensile strength to elongation as compared with the material processed in the usual manner.

Dr. Krivobok presented experimental data which showed that further improvement in the mechanical properties of stabilized types of stainless steels can be obtained if this subzero rolling is followed by a low-temperature heat treatment.

The speaker concluded with an interesting observation—namely, that the ductility of cold worked austenitic stainless steels is considerably greater at subzero temperatures. He then gave several illustrations of how this phenomenon can be used to advantage.

Head Saginaw Chapter for '51-52

Norton Nichols (Left) of Saginaw Steering Gear Co. Is Chairman of the Saginaw Valley Chapter. Frank L. Mackin of General Motors Institute is secretary-treasurer, and Albert A. Moore, Dow Chemical Co., is vice-chairman. (Reported by Paul L. Filter, Dow Chemical Co.)

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The Chicago Chapter Slate of Officers Elected for the 1951-52 Season Includes Thomas S. Simms of John Crerar Library, Assistant Secretary-Treasurer; E. L. Roff of U. S. Steel Co., Vice-Chairman; C. T. Prendergast of Western Electric Co., Chairman; and P. K. Zimmerman of Joseph T. Ryerson & Son, Inc., Secretary-Treasurer

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Treasurer—Charles E. Hanson, Room 1202, 60 East 42nd St., New York 17, N. Y.

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Vice-Chairman—Fred E. Stanley, 832 Edgefield Rd., Ft. Worth 7, Tex.
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Vice-Chairman—Gordon E. Willey, Algoma Steel Corp., Ltd., Sault Ste. Marie, Ont.
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Vice-Chairman—George Mooney, Auto Engine Works, Inc., St. Paul, Minn.
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Vice-Chairman — John E. DeMoss, University of Notre Dame, Dept. of Metallurgy, Box 145, Notre Dame, Ind.
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Vice-Chairman — William T. Carey, 103 Pacific Ave., Oak Ridge, Tenn.
Secretary—Francois Kertesz, 236 Outer Drive, Oak Ridge, Tenn.
Treasurer—Gene S. Storer, 100 Ontario Lane, Oak Ridge, Tenn.

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PENN STATE CHAPTER

Chairman—John L. Fisher, P.O. Box 231, State College, Pa.
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Secretary—W. H. Neu, 214 Martin Bldg., 119 Federal St., Pittsburgh 12, Pa.
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Vice-Chairman — Frederick Skinner, 10 Centre St., Natick, Mass.
Secretary-Treasurer—Arthur S. Johnson, 227 Washington St., Lakewood 5, R. I.

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Vice-Chairman—William J. Holtman, 475 Garfield St., Denver, Colo.
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ROCKY MOUNTAIN CHAPTER

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Vice-Chairman—Iver T. Ellingboe, R. #2, Box 260, Pueblo, Colo.
Secretary-Treasurer—David R. Appel, 410 Harrison St., Pueblo, Colo.

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Vice-Chairman—Gustav W. Pirk, Rome Cable Corp., Ridge St., Rome, N. Y.
Secretary-Treasurer—William M. Hinton, 512½ William St., Rome, N. Y.

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Secretary-Treasurer—William C. Hunter, 3870 Cleveland, St. Louis 10, Mo.

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Vice-Chairman—Joseph C. Thompson, 4273 Menlo Ave., Apt. 3, San Diego 5, Calif.
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Vice-Chairman—Dennis A. Byerly, 2505 North 12th St., Terre Haute, Ind.
Secretary—M. E. Hansell, Rose Polytechnic Institute, Terre Haute, Ind.
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Vice-Chairman—Wendell K. Hunt, 609 27th St., Bettendorf, Iowa
Secretary-Treasurer—C. Hibbard Savery, French & Hecht Div., Kelsey-Hayes Wheel Co., Davenport, Iowa

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Vice-Chairman—George R. Clay, 1930 South Wheeling, Tulsa, Okla.
Secretary-Treasurer—John G. Burke, 2965 S. Cincinnati Ave., Tulsa, Okla.

UTAH CHAPTER

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Vice-Chairman—Robert J. Prout, 560 North 1 East, American Fork, Utah
Secretary-Treasurer—H. E. Flanders, University of Utah, Metallurgical Dept., Salt Lake City, Utah

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Vice-Chairman—A. E. Gregg, Chief Metallurgist, Thomas Steel Co., Warren, Ohio
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Secretary-Treasurer—M. R. Meyerson, National Bureau of Standards, Northwest Bldg., Washington 25, D. C.

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Vice-Chairman—Thomas M. LaCrone, 1710 Kingston Ave., Kalamazoo, Mich.
Secretary-Treasurer—John B. Powers, 1511 Roosevelt Rd., Muskegon Heights, Mich.

WESTERN ONTARIO CHAPTER

Chairman—M. Fred Kennedy, Bendix-Eclipse of Canada, Ltd., Argyle Rd., Windsor, Ont.
Vice-Chairman—Jess W. Pawley, 122 Alexandre St., London, Ont.
Secretary-Treasurer — Raymond E. Barton, Canadian Mines Equipment Co., Ltd., 596 Hamilton Rd., London, Ont.

WICHITA CHAPTER

Chairman—Claude M. Hamilton, Jr., 516 North Roosevelt, Wichita, Kan.
Vice-Chairman—Allan F. Schroeder, 2010 North Estelle, Wichita 6, Kan.
Secretary—Robert E. Layton, 144 N. Clifton St., Wichita, Kan.
Treasurer—Eldon E. VanMeter, 155 South Chautaugua, Wichita, Kan.

WORCESTER CHAPTER

Chairman—J. Walter Gulliksen, Worcester Pressed Steel Co., 100 Barber Ave., Worcester 6, Mass.
Vice-Chairman—Wendell J. Johnson, 15 Knox St., Worcester 3, Mass.
Secretary-Treasurer — Lincoln G. Shaw, 15 South St., Auburn, Mass.

YORK CHAPTER

Chairman—C. Allen Sloat, 129 W. Lincoln Ave., Gettysburg, Pa.
Vice-Chairman—A. M. Roberts, 617 Hudson St., York, Pa.
Secretary-Treasurer—Roy E. Livingstone, 1717 Stanton St., York, Pa.

New Officers of the Worcester Chapter Are (From Left): Lincoln G. Shaw of Pratt & Inman, Secretary-Treasurer; Wendell J. Johnson, Massachusetts Steel Treating Corp., Vice-Chairman; J. Walter Gulliksen of Worcester Pressed Steel Co., Chairman; and Robert S. Morrow of George F. Blake, Inc., Retiring Chapter Chairman. (Reported by C. Weston Russell)

Educational Forum at Indianapolis Attracts 200 To Learn About Corrosion

Reported by Wynand W. Brandel
Allison Division, G.M.C.

Each year the Indianapolis Chapter A.S.M. sponsors an educational lecture series as a service to the technical peoples of Indianapolis and vicinity. The Educational Committee for the chapter chose "Corrosion of Metals" as the subject for the 1951 Educational Forum. Enrollment for the course totaled 200 individuals, representing 36 different companies—the largest enrollment to date for such a program.

The Educational Forum consisted of five lectures as follows:

"Basic Principles of Metallic Corrosion", by Edward L. Bolin, Experimental Chemist, Allison Division, G.M.C.

"Effect of Composition and Environment on Corrosion of Iron and Steel", by C. P. Larrabee, Research Technologist, U. S. Steel Co.

"Corrosion Resistance of Stainless Steel and High Nickel Alloys", by Glenn A. Fritzlen, Chief Research Metallurgist, Haynes Stellite Division.

"Copper and Copper Alloys in Corrosive Environments", by S. P. Snyder, Technical Advisor, Revere Copper and Brass, Inc.

"Corrosion of Light Metals", by E. H. Dix, Jr., Assistant Director of Research, Aluminum Co. of America.

The lecture series was based on the A.S.M. textbook entitled "Corrosion of Metals", and the material was augmented by the lecturers' experiences in industry with metallic corrosion and its prevention.

Lecturers were presented with a textbook and a personalized desk-pen set to commemorate the occasion, and at the termination of the series, each person attending all lectures was given a 100% attendance certificate.

The success of the 1951 Educational Forum was attributed to several factors. First, the subject was a timely one in a period of national conservation of metals. Second, the lecturers were recognized men in their particular field of endeavor. Finally, the work of the Educational Committee in publicizing the event and soliciting enrollment through an A.S.M. member in each company represented by Indianapolis Chapter membership contributed considerably to the success of the Forum.

NATIONAL MEETINGS
for September

Aug. 21-Sept. 1—Scientific Apparatus Makers Association. Summer Meeting, Laboratory Equipment Section, Northernaire Hotel, Three Lakes, Wis. (Kenneth Andersen, Executive Vice-President, S.A.M.A., 20 North Wacker Dr., Room 3120, Chicago 6.)

Sept. 10-14—Instrument Society of America. Sixth National Instrument Conference and Exhibit, Sam Houston Coliseum, Houston, Tex. (Richard Rimbach, Secretary, I.S.A., 921 Ridge Ave., Pittsburgh 12.)

Sept. 16-19—American Institute of Chemical Engineers. Regional Meeting, Hotel Sheraton, Rochester, N. Y. (S. L. Tyler, Executive Secretary, A.I.Ch.E., 120 East 41st St., New York 17.)

Sept. 25-26—Steel Founders Society of America. Fall Meeting, The Homestead, Hot Springs, Va. (F. Kermit Donaldson, Executive Vice-President, S.F.S.A., 920 Midland Bldg., Cleveland 15.)

Sept. 25-28 — American Society of Mechanical Engineers. Fall Meeting, Hotel Radisson, Minneapolis. (Ernest Hartford, Executive Assistant Secretary, A.S.M.E., 29 West 39th St., New York 18.)

Expands Alloy Foundry

J. J. Donovan, president of Midwestern Alloys Co., Chicago, has announced that his company will soon expand its present high-temperature, corrosion and heat resisting alloy casting facilities. The new alloy foundry, purported to be the largest in western United States for alloy castings, will be in Milwaukee.

A. S. M. Review of Current Metal Literature

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad, Received During the Past Month

Prepared in the Library of Battelle Memorial Institute, Columbus, Ohio
W. W. Howell, Technical Abstractor
Assisted by N. W. Baklanoff, Fred Rothfuss, and Leila M. Virtue

A GENERAL METALLURGICAL

197-A. Copper—Our Current and Future Needs and Supply. Charles A. Scarlott. *Materials & Methods*, v. 33, June 1951, p. 61-65.
An economic analysis. (A4, Cu)

198-A. Utilizing Machines to Fullest Extent at Seattle Port of Embarkation. Howard E. Jackson. *Modern Industrial Press*, v. 13, June 1951, p. 36, 38, 40, 42.
Large variety of work done by a few machines, including lift truck, press brake, band saw punch, circle cutter, roll pneumatic drum sander, and welding apparatus.
(A5, G general, K general)

199-A. First Boston Surveys the North American Aluminum Industry. *Modern Metals*, v. 7, June 1951, p. 37-40.
Analysis compiled by the First Boston Corp. of New York, a leading dealer and broker in bonds and securities. A concise review of the industry's chief features—history and growth, markets, competition, outlook, and a "profile" of each of the four North American producers.
(A4, Al)

200-A. The Tin Research Institute. *Engineer*, v. 191, June 8, 1951, p. 757.
New laboratory opened on May 31, 1951, located at Greenford, Middlesex, England. (A9, Sn)

201-A. The Treatment of Liquor From Continuous Strip Pickling Lines. J. Pearson. *Sheet Metal Industries*, v. 28, June 1951, p. 501-516.
How "spent" liquor of high acid strength is treated to recover H_2SO_4, then disposed of. 27 ref. (A8, L12)

202-A. The Problem of Iron and Steel. *Engineering*, v. 171, June 8, 1951, p. 683-684; June 15, 1951, p. 715-716.
An economic analysis covering not only Britain and her dominions, but the U. S., Russia, and other countries. (A4, Fe, ST)

203-A. The Steel Outlook for the Near Future. Benton J. Willner. *Finish*, v. 8, July 1951, p. 33, 58-59.
Economic analysis and forecast. (A4, ST)

204-A. Direct Extrusion Applied to Light Metal Scrap. Max Stern. *Iron Age*, v. 167, June 28, 1951, p. 71-73.
Dispersion of oxides, destruction of chip layers, and almost normal properties were obtained in bars extruded at about 750° F. and 15 tons per sq. in. Rounds, profiles, and notched ingots for deoxidation of steel can be produced at or near the point of origin of Al scrap. Diagram shows design of rotary furnace and extrusion press for continuous production of bar stock from scrap.
(A8, F24, Al)

205-A. Diamonds From Dust. R. S. Young and A. D. McDonald. *Iron Age*, v. 167, June 28, 1951, p. 76-77.
With diamond powder worth $7 a gram, recovery from metal waste piles has become very attractive. Wet separation is more effective than dry separation; however, other media than water are used.
(A8, C-b)

206-A. Nickel in 1950; Review of World Demand and Output. *Iron and Steel*, v. 24, June 15, 1951, p. 234.
Based on talk by John F. Thompson, president of International Nickel Co. of Canada. (A4, Ni)

207-A. Recovery of Zinc Wastes—Former Uneconomic Processes Now Possible. *Times Review of Industry*, v. 5, June 1951, p. 24.
Neglected scrap and residues and their possibilities of treatment.
(A8, C21, Zn)

208-A. Castle Industries Inc., Seattle: A Case Study of a Sub-Contractor. Howard E. Jackson. *Western Metals*, v. 9, June 1951, p. 33-35.
Factory does airframe subassembly work. Layout, equipment, methods, materials, and restrictions.
(A5, T24, SS, Al)

The coding symbols at the end of the abstracts refer to the ASM-SLA Metallurgical Literature Classification. For details write to the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

209-A. The Laboratory of the Mond Nickel Co., Ltd., at Birmingham. (In French.) *Métaux Corrosion Industries*, v. 26, Apr. 1951, p. 170-178.
Facilities and activities. (A9, Ni)

210-A. Review of Iron and Steel Literature For 1950. Part II. (Concluded.) Morris Schrero. *Blast Furnace and Steel Plant*, v. 39, July 1951, p. 813-816, 823-824, 850.
(A10, Fe, ST)

211-A. Aluminium Casting Alloys; Quality Production From Secondary Materials. F. H. Smith. *Metal Industry*, v. 78, June 15, 1951, p. 479-482; June 22, 1951, p. 502-503; June 29, 1951, p. 525-526. (A condensation.)
Equipment and procedures used in Britain. (A8, Al)

212-A. (Book) Watkins Cyclopedia of the Steel Industry. Ed. 3. 494 pages. 1951. Steel Publications, Inc., 4 Smithfield St., Pittsburgh 30, Pa.
Chapters cover steel industry; coal and coke; iron ore; manufacture of iron; steel-melting processes; rolling and shaping of steel; carbon and alloy steels; forging, forming, and finishing steel; joining of steel; and heat treatment of steel.
(A general, ST)

B RAW MATERIALS AND ORE PREPARATION

179-B. Sedimentation. S. Hesling. *International Chemical Engineering & Process Industries*, v. 32, June 1951, p. 273-276.
The theoretical and practical approach to sedimentation problems. Types of equipment used in the complementary operations of sedimentation and thickening. (B14)

180-B. Sodium Chloride in Cyanidation at Renabie. E. G. Kearney and W. J. Fenton. *Canadian Mining Journal*, v. 72, June 1951, p. 63-67.
Treatment of a highly siliceous, low-sulfide Au ore at Renabie, by flotation, jigs, and cyanidation, was previously described. Improvements effected in the treatment during 1950, without changing the basic flow sheet, have resulted in increasing recovery at each stage by approximately 1%, to give an overall recovery of 91% or better. The improvement in recovery by cyanidation is, it is believed, almost entirely due to the addition of common salt to the plant solutions. (B14, Au)

181-B. Pre-Aeration, Cyanidation and Other Metallurgical Investigations of Ore From Big Bell, W.A. H. H. Dunkin and K. S. Blaskett. *Commonwealth Scientific and Industrial Research Organization and the Mining Department, University of Melbourne*, Ore-Dressing Investigation no. 370, Oct. 5, 1950, 32 pages.
General plan of investigation and details of methods. Results of cyanidation tests in which different factors were varied. Work on the plant tailings sample included screening, flotation, infrasizing of concentrate and tailings and mineralogical examination of the fractions. Mode of occurrence of Au in the residues. (B14, Au)

182-B. Recovery of Tin From Roasted Ore From the Ottery Mine, Emmaville, N.S.W. H. H. Dunkin and K. S. Blaskett. *Commonwealth Scientific and Industrial Research Organization and the Mining Department, University of Melbourne*, Ore-Dressing Investigation no. 390, Oct. 19, 1950, 5 pages.
Results of benefication tests are tabulated. Conclusions are summarized. (B14, Sn)

183-B. Flotation of Silver Ore From the White Rock Mine at Drake, N.S.W. H. H. Dunkin and K. S. Blaskett. *Commonwealth Scientific and Industrial Research Organization and the Mining Department, University of Melbourne*, Ore-Dressing Investigation no. 391, Oct. 18, 1950, 4 pages.
Results of mineralogical examination and flotation tests. (B14, Ag)

184-B. Processes Occurring During the Stirring of Commercial Alumina Hydrates. (In German.) Fr. W. Wrigge and H. Ginsberg. *Zeitschrift für anorganische und allgemeine Chemie,* v. 264, May 1951, p. 285-297.

Inoculation effect of normal $Al(OH)_3$ on the aluminate lyes of the Bayer process for recovery of alumina from bauxite was investigated. The primary constituent in each case is gibbsite. Effectiveness of the gibbsite as an inoculant is explained by the presence of active centers on the crystal surfaces. 65 ref. (B14, Al)

185-B. Oxidation-Reduction Processes During Precipitation of Metals From Cyanide Solutions. (In Russian.) I. N. Plaksin and O. K. Budnikova. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Feb. 1951, p. 267-272.

Experimental investigation, using precipitation of Au and Zn as an example, showed that the presence of O_2 in cyanide solutions has considerable influence on the density of deposition. It was also found that the action of the dissolved O_2 depends on its concentration in solution and on process conditions. (B14, Au)

186-B. Sweden's Iron and Steel Industry. T. L. Joseph. *Journal of Metals,* v. 3, July 1951, p. 507-510.

During the summer of 1950, the author visited several large iron ore mines and steel plants in Sweden. His report covers iron ore, concentrating, sintering, iron production, steel production, and phases of these functions that were developed to meet conditions peculiar to the country. (B general, D general, ST)

187-B. Concentration of the Complex Copper-Lead-Cobalt-Nickel Ores of Southeast Missouri. M. M. Fine, W. E. Brown, G. J. Vahrenkamp, and R. G. Knickerbocker. *Mining Engineering,* v. 3, July 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 190, 1951, p. 602-604.

Results of a research and development laboratory and pilot-plant mineral-dressing investigation showed that separate concentrates of Pb, Cu, and Co-Ni could be made by grinding and flotation. An industrial plant built subsequently produced such concentrates during the war years. Present commercial production is limited to Pb and Cu concentrates, but research to permit economic utilization of the Co and Ni values is continuing. (B13, B14, Pb, Cu, Co, Ni)

188-B. Simple Treatment Methods for Sulfide Gold and Silver Ores. A. L. Engel. *U. S. Bureau of Mines,* Report of Investigations 4790, May 1951, 17 pages.

Treatment of ore from ten western mines in several districts. Methods used include gravity concentration, amalgamation, flotation, cyanidation, and, in one case, roasting. For the most part, only standard laboratory procedures were employed. (B14, B15, Au, Ag)

189-B. Ore Agglomeration; The Smidth Kiln at East Moors Works, Cardiff. W. E. Simons. *Iron and Steel,* v. 24, June 15, 1951, p. 273-277; disc., p. 315-318.

Previously abstracted under similar title from *Journal of the Iron and Steel Institute.* See item 76-B, 1951. (B16, Fe)

190-B. Sinter Making; Plant Research at Appleby-Frodingham. G. D. Elliot and N. D. Macdonald. *Iron and Steel,* v. 24, June 15, 1951, p. 278-281; disc., p. 315-318.

Previously abstracted under similar title from *Journal of the Iron and Steel Institute.* See item 119-B, 1951. (B16, Fe)

191-B. Sinter Quality; Effects of Controlled Variables. Part I. Development of Experimental Sinter Plant and Preliminary Results Using Northants Ore. E. W. Voice, C. Lang, and P. K. Gledhill. *Iron and Steel,* v. 24, June 15, 1951, p. 282-285; disc., p. 315-318.

Previously abstracted from *Journal of Iron and Steel Institute.* See item 146-B, 1951. (B16, Fe)

192-B. Northants Ore; A Production-Plant Study of Factors Affecting Sinter Quality. D. W. Gillings, E. W. Voice, C. Lang, and P. K. Gledhill. *Iron and Steel,* v. 24, June 15, 1951, p. 285-293; disc., p. 315-318.

Previously abstracted under similar title from *Journal of the Iron and Steel Institute.* See item 147-B, 1951. (B16, Fe)

193-B. Plant Experiences With the Flotation of Arsenical Cobalt-Nickel Ores and Bismuth Oxide Ores. (In German.) Günther Salzmann. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 4, June 1951, p. 222-225.

Plant results show that these ores can be successfully beneficiated in an acid sludge. (B14, Co, Ni, Bi)

194-B. How to Get More Tonnage Through Your Present Mill. J. J. Burns. *Engineering and Mining Journal,* v. 152, July 1951, p. 120-121.

Suggestions on increasing production with existing equipment for size reduction of ores. (B13)

195-B. Check These Equipment Ideas for Greater Mill Production. *Engineering and Mining Journal,* v. 152, July 1951, p. 122-125.

A variety of ideas now in use to make size-reduction and beneficiation plants more efficient. (B13, B14)

196-B. How to Use Quality Control to Improve Mill Production. Adrian C. Dorenfeld and Morton H. Dorenfeld. *Engineering and Mining Journal,* v. 152, July 1951, p. 126-129.

Methods are clarified by graphs. Refers to size reduction and beneficiation of ores. (B13, B14)

197-B. How New Units, New Uses Widen Scope of Sink-Float. *Engineering and Mining Journal,* v. 152, July 1951, p. 130-132.

Question-and-answer survey of the latest sink-float developments. (B14)

198-B. Manganese Concentration From Low Grade Domestic Ore; Nossen Nitric Acid Cycle. Ernest S. Nossen. *Industrial and Engineering Chemistry.* v. 43, July 1951, p. 1695-1700.

Cycle which permits separation of Mn from iron, silica, and other undesirable impurities and decomposition of the formed manganese nitrate solution directly to MnO_2 and HNO_3. Mn recovery is satisfactory in many ores that formerly were inaccessible to treatment. Pilot-plant development of technology of the process in continuous operation. Data for several ores for commercial operation. The product, mainly MnO_2, is suitable for the chemical and dry-cell battery industries. 11 ref. (B14, Mn)

199-B. Mineral Separation by an Electrochemical-Magnetic Method. H. C. G. Vincent. *Nature,* v. 167, June 30, 1951, p. 1074.

Simple method for separation of minerals with a relatively high electrical conductivity in rock powders. It is based on the selective deposition upon these minerals of metallic Fe, in an elctrolytic cell, enabling them to be separated from the nonconducting grains with a magnet. The method has application in the common case where the specific gravity of the constituents is too high for heavy-liquid separation, and electrostatic and dielectric methods, froth flotation, panning, or selective chemical attack are inadequate. (B14)

C

NONFERROUS EXTRACTION AND REFINING

76-C. New Smelting Process Means More TiO_2 for Us. *Chemical Engineering,* v. 58, June 1951, p. 184, 186.

New Canadian process. Control of charge composition and furnace conditions so that little or no flux need be added gives a marketable melting iron and a Ti-rich slag suitable for acid digestion and leaching. (C21, D8, Ti, Fe)

77-C. Vacuum Fusion. *Metal Progress,* v. 59, June 1951, p. 852, 854, 856, 858, 860-862. Condensed from "The Influence of Vacuum Fusion Upon the Characteristics of Ferrite Containing 25% Chromium", J. Hochmann.

Previously abstracted from *Bulletin du Cercle d'Etudes des Métaux.* See item 33-C, 1951. (C25, Fe-n)

78-C. Theory of the Electrolytic Preparation of Aluminum. (In French.) E. Bonnier. *Bulletin de la Société Chimique de France,* Nov.-Dec. 1950, p. D131-D140.

Criticisms supported by experimental evidence. 51 ref. (C23, Al)

79-C. Influence of Iron and in Particular of Zinc Ferrites on the Reduction of Zinciferous Products. (In French.) E. Frenay. *Revue Universelle des Mines, de la Metallurgie des Travaux Publics, des Sciences et des Arts appliques a l'Industrie,* v. 94, Jan. 1951, p. 25-35.

Investigation using pure materials shows that in comparison to charges without Fe, extraction of Zn in the presence of Fe is slower during the first phase and faster during the second phase. Under certain conditions, final acceleration is accelerated more by the presence in the charge of Zn ferrites than by free ferric oxide. 10 ref. (C21, Zn)

80-C. Separation of Copper From Zinc by Ion Exchange. Ernest J. Breton, Jr., and A. W. Schlechten. *Journal of Metals,* v. 3, July 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 517-521.

Ion exchange has been used for recovery of metals from waste waters. This fact suggested study of possibilities for use in metallurgical recovery processes. Experiments on the separation of Cu and Zn ions by selection action of ion-exchange resins showed the carboxylic type to be more effective than the sulfonic resins. The latter demonstrated a greater capacity over a wider pH range. Data show the effectiveness of resins as a means of concentration. (C28, A8, Cu, Zn)

81-C. Production of Aluminum-Silicon Alloys in the Electric Furnace. (In French.) Y. Dardel. *Journal du Four Electrique et des Industries Electrochimiques,* v. 60, Mar.-Apr. 1951, p. 37-39; May-June 1951, p. 68-70.

Process utilizing simultaneous reduction of Al_2O_3 and SiO_2; concentration limits and temperature conditions. 37 ref. (C21, Al)

82-C. Electrothermal Refining of Copper Concentrates in Italy. (In French.) M. C. Ferrante. *Journal du Four Electrique et des Industries Electrochimiques,* v. 60, May-June 1951, p. 71-72.

Includes flow diagrams for production of electrolytic Cu wires and bars, also precious metals from concentrates containing about 20% Cu. (C23, Cu, EG-c)

83-C. Cryoscopy in Fused Cryolite Ionization of Aluminum and Dissolved Oxides. (In French.) Maurice Rolin.

Revue de Métallurgie, v. 48, Mar. 1951, p. 182-186; disc., p. 186.

Mechanism of Al production in the Héroult process. The Al is directly ionized and cryoscopic procedures were used for identification of the ions. (C21, Al)

84-C. Determination of Electrical Resistance of Alumina-Cryolite Solid Solutions as a Function of Temperature. (In Italian.) A. Vajna. *Alluminio*, v. 20, 1951, p. 147-149.

Results of a series of experiments applied to a study of current leakage in the solid crust which forms on the surface of commercial cells for production of Al. Inferences are drawn concerning the structure of alumina-cryolite solid solutions near the eutectic point. (C23, Al)

85-C. Look to New Ideas and New Processes Like These for Greater Production From Tomorrow's Smelters. *Engineering and Mining Journal*, v. 152, July 1951, p. 134-137.

Procedures and equipment, present status, and potentialities of use of ion-exchange resins, vacuum metallurgy, the inverted blast furnace (nonferrous), electromagnetic pumping of molten metals, flash smelting, and fluo-solids techniques. (C21)

86-C. What the Future Holds for Hydrometallurgy. N. Arbiter and H. H. Kellogg. *Engineering and Mining Journal*, v. 152, July 1951, p. 139-143.

Table shows how hydrometallurgy is being used for primary extraction of various nonferrous metals. Relative merits of hydrometallurgy and pyrometallurgy. 17 ref. (C23, C24, EG-a)

87-C. The Preparation and Some Properties of Americium Metal. Edgar F. Westrum, Jr. and LeRoy Eyring. *Journal of the American Chemical Society*, v. 73, July 1951, p. 3396-3398.

AmF_3 prepared by hydrofluorination of the dioxide was reduced to metal on a 40-200 microgram scale by reduction with Ba metal in a high-vacuum micro-furnace at 1100° C. in various refractory materials. High yields of silvery, very malleable and ductile, metal globules were obtained. Density was determined as 11.7. Heat of solution of the metal in 1.5 molar aqueous HCl was also determined. 17 ref. (C25, P10, P12, Am)

88-C. Nickel Alloys for Oxide-Coated Cathodes. A. M. Bounds and T. H. Briggs. *Proceedings of the I.R.E.*, v. 39, July 1951, p. 788-799.

Metallurgical problems and manufacturing methods used in refining and melting of Ni, and its fabrication into indirectly heated cathode sleeves for electron tubes. Role of minor constituent alloys from metallurgical and electronic points of view. Influences of each important element present in cathode Ni alloy. Suggestions concerning present and future developmental cathode material. (C21, T1, Ni)

89-C. Production of High Purity Calcium Metal by Thermal Reduction Method. III. Observation on the Mechanism of the Reaction. IV. Refining of Calcium Metal by Vacuum Distillation (In Japanese.) Eiichi Fujita. *Reports of the Government Chemical Industrial Research Institute, Tokyo*, v. 46, Feb. 1951, p. 75-94; Eng. abst., p. vi-vii.

Results of experimental investigation. Apparatus is diagrammed; data are charted and tabulated. (C21, C25, Ca)

90-C. Solar-Furnace Experiments With Hydrogen on the Metallurgy of Chromium. (In French.) F. Trombe and M. Foex. *Revue de Métallurgie*, v. 48, May 1951, p. 359-362.

Use of H_2 to reduce Cr_2O_3 in solar furnace. Apparatus is diagrammed and illustrated. (C21, Cr)

D

FERROUS REDUCTION AND REFINING

213-D. Electric Furnace or Open Hearth? C. F. Ramseyer. *Iron and Steel Engineer*, v. 28, June 1951, p. 57-67.

Proposed modern top-charge electric-furnace-steel meltshop designed to produce ordinary tonnage carbon steels at low cost. Estimated capital and operating costs. Assuming the availability of purchased power, data indicate that such a shop can be built for approximately half that of an openhearth shop of equivalent capacity, and that with 8-mill power it could make steel from an all-cold-scrap charge more cheaply than the openhearth. Such a shop would have an excellent chance of making steel from hot metal and scrap charges at an over-all production cost no greater than that of most modern openhearth plants. (D5, ST)

214-D. Storage and Distribution of Oxygen for the Open Hearth. B. P. Sarasin and R. Tietig, Jr. *Iron and Steel Engineer*, v. 28, June 1951, p. 81-89; disc., p. 89-90.

Recommendations for design: Charts show O_2 required for decarburization and for openhearth plants. Generation methods. Three types of distribution systems are diagrammed. (D2, ST)

215-D. Recent Developments at the Sydney Steel Plant. Norman A. Parlee. *Canadian Mining and Metallurgical Bulletin*, v. 44, June 1951, p. 382-387; *Transactions of the Canadian Institute of Mining and Metallurgy*, v. 54, 1951, p. 234-239.

Developments during the past 5 yrs. and those now in process at Dominion Steel and Coal Corp., Sydney, Cape Breton Island, Nova Scotia. (D general, ST)

216-D. Research on the Deoxidation of Killed Openhearth Steel. (In French.) M. Nepper and H. Herbiet. *Revue Universelle des Mines, de la Métallurgie des Travaux Publics, des Sciences et des arts appliques a l'Industrie*, v. 94, Feb. 1951, p. 56-70.

Results of research on different heats. By using a series of different physical and chemical methods, an attempt was made to classify such steels on the basis of their internal macrostructure and to relate their quality to the deoxidation process. 12 ref. (D2, ST)

217-D. Slag Control in Openhearth Furnaces. (In Polish.) K. Radzwicke and F. Fiolkowna. *Prace Glownego Instytutu Metalurgii*, v. 3, no. 1, 1951, p. 1-9.

Difficulties encountered with the slag-pancake method. Potentiometric, conductometric and volumetric methods for evaluating slag basicity were compared. A volumetric method was chosen. (D2, ST)

218-D. Refining of the Openhearth Bath With Oxygen. (In Polish.) J. Natkaniec. *Prace Glownego Instytutu Metalurgii*, v. 3, no. 1, 1951, p. 47-53.

Advantages and disadvantages. Experiments on a 36-ton furnace in which 57 O_2 heats were made show an increase of furnace output of 15.4%, reduction of time for making the heat of 13.4%, decrease of consumption of ore of 58.7%, and of fuel of 17.3%. Very satisfactory results were also obtained from five heats where O_2 was used to melt scrap. Time of making the heat was reduced by 43.8% and furnace output increased by 77.8%. (D2, ST)

219-D. Effect on Quality of Metallurgical Coke of Reduction of the Coking Properties of Coke Blends by Coke-Breeze Additions. (In Polish.) F. Byrtus. *Prace Glownego Instytutu Metalurgii*, v. 3, no. 2, 1951, p. 85-95.

Investigation using 6% coke breeze added to Upper Silesia coals on a semi-production scale. Increase of crushing strength and reduction of abradability resulted. Extensive investigations indicated suitability for the blast-furnace process. (D1)

220-D. Vanadium in the Acid Process for Steel Production and the Reducing Ability of Vanadium. (In Russian.) I. A. Popov and B. V. Stark. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Feb. 1951, p. 261-266.

Experimental investigation showed that, in acid openhearth slags containing V and consisting of oxides of Fe, Si, Mn, and V, the latter forms an isolated phase corresponding to the spinel type of compound $FeO{\cdot}V_2O_3$. The equilibrium constant for the V reaction and its temperature dependence for the acid process were determined. Reducing ability of V was found to be less than that of Si. 10 ref. (D2, ST, V)

221-D. Steelmaking for Castings. (Concluded.) John Howe Hall. *Foundry*, v. 79, July 1951, p. 77, 232-241.

Details of operating practice with the basic openhearth furnace. (D2, CI)

222-D. Control of Sulphur in Steelmaking. G. Derge and S. Marshall. *Journal of Metals*, v. 3, July 1951, p. 511-516.

Summarizes proceedings of AIME symposium held in Feb. 1951. (D general, ST)

223-D. Recent Developments in Ingot Mold Coatings. John N. Datesh. *Steel Equipment & Maintenance News*, v. 4, June 1951, p. 18-19.

Although more expensive than tar or pitch, commercial mold coatings are said to offset their original cost by improving ingot surface conditions and by eliminating objectionable fumes and handling difficulties. Macrographs show surface conditions of coated and uncoated molds. (D9, CN)

224-D. Advances in Stainless Steelmaking Practice. A. B. Scott. *Australasian Engineer*, Apr. 7, 1951, p. 44-50.

New equipment and procedures. (D general, SS)

225-D. Flow Patterns in Furnaces. J. H. Chesters. *Chemistry & Industry*, June 16, 1951, p. 448-455.

Summarizes research reported in recent papers in *Journal of the Iron and Steel Institute;* also work done since on three-dimensional geometrical systems, on hot models, and also on full-size openhearth furnaces. Technique in which Perspex dishes of different shapes, containing a suspension of bakelite powder in water, were used. Jets of water were introduced at different locations and flow patterns photographed. (D2, ST)

226-D. All-Basic Furnaces; Results Obtained From Six British and Two Dutch Open-Hearths. *Iron and Steel*, v. 24, June 1951, p. 199-203.

Summary of seven papers presented at a joint conference of British Ceramic Research Assn. and British Iron and Steel Research Assn., May 2-3, 1951. Data are tabulated; furnace designs are diagrammed and illustrated. (D2, ST)

227-D. Iron Making; Significance of Equilibrium and Reaction Rate. J. B. Austin. *Iron and Steel*, v. 24, June 15, 1951, p. 253-255; disc. p. 309-311.

Previously abstracted under similar title from *Journal of the Iron and Steel Institute*. See item 181-D, 1951. (D1, Fe)

228-D. U. S. Iron Production; Some Aspects of the Blast-Furnace Position. Owen R. Rice. *Iron and Steel*, v. 24, June 15, 1951, p. 256-265; disc., p. 311-314.

Technological and economic status of blast-furnace practice in the U. S. Comparison to operating data obtained from Great Britain, Netherlands, South Africa, India, and Brazil. The situation in iron ore, sinter, coal and coke, refractories including carbon linings, high-pressure operation, use of O_2, design and construction, manpower requirements, and total costs. (D1, Fe)

229-D. All-Carbon Blast-Furnaces; Their Evolution. J. H. Chesters, G. D. Elliott, and J. Mackenzie. *Iron and Steel*, v. 24, June 15, 1951, p. 266-271; disc., p. 311-314.

Previously abstracted under similar title from *Journal of the Iron and Steel Institute*. See item 150-D, 1951. (D1, Fe)

230-D. Radioactive Indicators; Detection of Blast-Furnace Refractory Wear. E. W. Voice. *Iron and Steel*, v. 24, June 15, 1951, p. 271-273; disc., p. 311-314.

Previously abstracted under similar title from *Journal of the Iron and Steel Institute*. See item 122-D, 1951. (D1, S19, Fe, Co)

231-D. Blast-Furnace Operation; Full-Scale Trials Without Undue Interference With Output. J. A. Bond and T. Sanderson. *Iron and Steel*, v. 24, June 15, 1951, p. 294-298; disc., p. 318-320.

Previously abstracted under similar title from *Journal of the Iron and Steel Institute*. See item 194-D, 1951. (D1, Fe)

232-D. Blast-Furnace Materials. III. Further Factors Influencing the Distribution of Solids. R. Wild. *Iron and Steel*, v. 24, June 15, 1951, p. 299-306; disc., p. 318-320.

Previously abstracted under similar title from *Journal of the Iron and Steel Institute*. See item 43-D, 1951. (D1, Fe)

233-D. Converter Process; Economic Comparison With Other Steelmaking Processes. Bernhard Matuschka. *Iron and Steel*, v. 24, June 15, 1951, p. 251-253; disc. p. 306-308.

Previously abstracted under similar title from *Journal of the Iron and Steel Institute*. See item 195-D, 1951. (D3, D2, ST)

234-D. Treatment of Nickel-Chromium-Molybdenum Steels. (In French.) *Circulaire d'Informations Techniques*, v. 8, no. 1, [1951], p. 75-96.

Report of committee of electric furnace steel engineers includes a report by M. Babel on testing of Ni-Cr-Mo steels and influence of refining conditions. Procedure and conclusions. (D5, AY)

235-D. Experimental Study of Factors Which Influence the Blast Pressure of a Blast Furnace. (In French.) P. Thierry, J. Szczeniowski, and J. Laborne. *Revue de Métallurgie*, v. 48, Mar. 1951, p. 187-193.

Results of study of pressures as a function of flow. Permeability of the bed to flow of gases, influence of blast section, and influence of temperature. (D1, Fe)

236-D. Some Properties of Iron Made in the Basic Bessemer Converter and Its Capacity for Dissolving Steel. (In French.) M. Moray. *Revue de Métallurgie*, v. 48, Mar. 1951, p. 194-198; disc., p. 198.

True temperature of the molten metal, its fluidity, its ability to dissolve steel, and its solidification temperatures were studied. (D3, ST)

237-D. Improvement of Apparatus for Metering Gas Flow. (In French.) R. Michaux and P. Leroy. *Revue de Métallurgie*, v. 48, Mar. 1951, p. 236-241.

Apparatus designed particularly for use in measurement of gas flow rates in the basic bessemer converter. How it may be used for systematic study of permeability of the charge to the blast as a function of properties of the ore and the limestone, of capacity and internal shape of the converter, and of arrangement and number of tuyeres. (D3, ST)

238-D. Hot Metal Cars and Mixers; How Design Factors Affect Lining Life. R. P. Heuer and C. E. Grigsby. *Steel*, v. 129, July 16, 1951, p. 82, 84, 87-88.

Second of series appraising refractories for handling hot metal. How equipment design, brick size, mortar quality, and type of bricklaying all enter into determining how long linings will remain serviceable. (D1)

239-D. The All-Basic Open-Hearth Furnace. *Metallurgia*, v. 43, June 1951, p. 289-294.

Summarizes 6 papers presented at recent British conference. Features of furnaces are described, diagrammed, and illustrated. (D2, ST)

240-D. Metallurgical Tests With the Solar Furnace. (In French.) F. Trombe and M. Foex. *Revue de Métallurgie*, v. 48, May 1951, p. 353-358.

A solar laboratory and some experiments on fusion of Fe in the solar furnace. Compares results obtained by different methods of heating. (D8, Fe)

241-D. Desulfurization of Pig Iron With Pulverized Lime. (In Swedish.) Bo Kalling, Christer Danielsson, and Ottar Dragge. *Jernkontorets Annaler*, v. 135, No. 3, 1951, p. 89-106.

Molten iron is brought into contact with powdered burnt lime under strongly reducing conditions. Lime must be kept in powdered form during treatment. By the treatment the iron can be desulfurized in a very short time without much heat loss. Data are tabulated and graphed. 15 ref. (D1, Fe)

242-D. Desulfurization of Hot Metal With Powdered Burnt Lime. (In Swedish.) Sven Fornander. *Jernkontorets Annaler*, v. 135, No. 3, 1951, p. 107-115.

Metal is transferred from blast furnace to rotary furnace and lime is added. About 90% of the sulfur is absorbed by the lime in 30 min. (D1, Fe)

E

FOUNDRY

352-E. Problem in Gray Iron Molding. J. W. Birks. *American Foundryman*, v. 19, June 1951, p. 34-37.

Details of pattern construction and molding method for a gray-iron still casting which must be sound in order to withstand high pressures in service. Poured weight of the casting is approximately 3300 lb., and cleaned weight 3060. (E11, CI)

353-E. Factors Governing Sea Coal Selection and Control. E. C. Zirzow. *American Foundryman*, v. 19, June 1951, p. 45-47.

Sea coal is a term used to describe any pulverized coal used in foundry molding sands. It is manufactured by grinding or pulverizing coal using various types of mills. Fineness is controlled by screening or air flotation. Reaction when molten metal enters a mold containing sea coal, four functions of sea coal and theories of mechanism of action. (E18)

354-E. Modern Foundry Methods . . . Straighten Malleable Iron Castings. *American Foundryman*, v. 19, June 1951, p. 48-49.

Inspection and straightening methods employed in a malleable foundry producing automotive castings are presented in outline form from the paper "Equipment and Methods of Straightening and Dimensional Inspection of Malleable Iron Castings," by Leslie N. Schuman, presented at 55th AFS Annual Meeting, Buffalo, Apr. 23-26, 1951. (E24, S13, CI)

355-E. Bentonite Bonding Properties Affected by Drying Temperature and Moisture Content. F. L. Cuthbert and T. M. Cuthbert. *American Foundryman*, v. 19, June 1951, p. 50-51.

Limited to the so-called Western bentonites. (E18)

356-E. Production of Heavy Castings for Electrical Generating Equipment. N. Charlton. *Institute of British Foundrymen*, Advance Paper 1001, 1951, 8 pages.

Procedures and equipment of British firm. (E11, CI)

357-E. Relationship Between Modern Foundry Methods and the Quality of Castings. F. R. Elliott. *American Society of Mechanical Engineers*, Advance Paper 51-S-20, 1951, 8 pages.

A general discussion. (E general)

358-E. What is Foundry Sand? Douglas C. Williams. *American Society for Mechanical Engineers*, Advance Paper 51-S-23, 1951, 7 pages.

Types, properties, and applications. (E 18)

359-E. Report of Committee B-6 on Die-Cast Metals and Alloys. J. R. Townsend, chairman. *American Society for Testing Materials*, Preprint 11, 1951, 27 pages.

Consists largely of a paper entitled, "Aluminum Die Castings—The Effect of Process Variables on Their Properties", by W. Babington and D. H. Kleppinger. A test casting die was specially designed in which pressures of 500-100,000 psi. and gate thicknesses of 0.030 and 0.090 in. can be used. Special instrumentation was developed for measuring and recording true molten-metal pressure, die-face temperatures, and plunger speeds. A relationship is established between radiographic soundness and tensile strength by which maximum tensile strength may be predicted from soundness ratings. (E13, Al)

360-E. Manufacture of Centrifugally Cast Iron Pipe. *Industrial Heating*, v. 18, June 1951, p. 1008, 1010, 1012-1014, 1016, 1018, 1022.

At plant of American Cast Iron Pipe Co., Birmingham. (E14, CI)

361-E. Modern Foundry With Comprehensive Production Facilities. *Light Metals*, v. 14, June 1951, p. 346-350.

British foundry which produces miscellaneous ferrous and non-ferrous castings. (E general)

362-E. Casting-In of Inconel Tubes in Copper Blocks. F. J. Lambert. *Metal Progress*, v. 59, June 1951, p. 809-811.

Difficulties experienced in successful conduct of this operation which is used in construction of electrical heaters for the electromagnetic method of separation of U isotopes. The elements consisted of Nichrome filaments centered in welded Inconel tubes and insulated from them by means of tamped magnesia. Frequently these heaters have failed after only a short period. Effect of heater position in the mold on the casting; effect of surface preparation of the Inconel tubing on adherence to the Cu-alloy casting; and relative merits of seamless tubing and welded tubing were studied. (E11, Ni, Cu)

363-E. Forgeable Arc-Melted Tungsten. Harry B. Goodwin and Charles T. Greenidge. *Metal Progress*, v. 59, June 1951, p. 812-814.

Procedures and equipment developed at Battelle Memorial Institute. The technique used was similar to that for Mo. It consisted of arc melting in a water-cooled crucible

which also acted as the ingot mold. The product was found to be forgeable, although metal produced by powder-metallurgy methods is not. Greater purity is believed to be responsible. (E10, W)

364-E. Centrifugal Castings for Turbines. *Metal Progress,* v. 59, June 1951, p. 868, 870. (Condensed from "Centrifugal Steel Castings for Gas Turbines", J. Taylor and D. H. Armitage, *Iron and Steel Institute,* "Symposium on High Temperature Steels and Alloys for Gas Turbines," Feb. 1951, p. 205-208.)

Previously abstracted from condensed version in *Foundry Trade Journal.* See item 200-E, 1951. (E14, CI)

365-E. Investment Casting. *Metal Progress,* v. 59, June 1951, p. 874, 876, 878. (Condensed from "Investment Casting of Nozzle Guide Vanes", H. E. Gresham and A. Dunlop, *Iron and Steel Institute,* "Symposium on High-Temperature Steels and Alloys for Gas Turbines," 1951.)

Procedure and recommendations, including composition of a suitable spray-coat mixture, a suitable refractory, and a good bonding liquid. (E15)

366-E. Loam and Dry-Sand Moulding for a Crane Barrel. Terry Walton. *Foundry Trade Journal,* v. 90, June 7, 1951, p. 611-613.

Step-by-step description of the making of a large hollow barrel-shaped casting. (E19, CI)

367-E. Valve Tappet Castings. René Dulché. *Foundry Trade Journal,* v. 90, June 7, 1951, p. 597-605.

General characteristics, and method of manufacture adopted in a French foundry. Covers requirements of patterns, chills, and molding boxes; molding; coremaking; mold assembly, closure, and metallurgy; and finishing with fettling and control. Foundry layout and organization. (E11, CI)

368-E. Thermal Considerations in Foundrywork. Victor Paschkis. *Institute of British Foundrymen,* Advance Paper 995, 1951, 14 pages.

Fundamentals of heat transfer by analogy to flow of liquid metals. Practical consequences of heat transfer theory as applied to foundry problems. Some methods of making thermal studies and application of the mass-flow analyzer (a computing machine) to prediction of results of metal-solidification tests. Problems needing further research. (E25)

369-E. Some Present-Day Practices in Patternmaking. B. Levy. *Institute of British Foundrymen,* Advance Paper 999, 1951, 8 pages. (E17)

370-E. Manufacture of Propellers and Other Castings. C. W. Stewart. *Institute of British Foundrymen,* Advance Paper 1002, 1951, 8 pages.

Procedures and equipment of British ferrous foundry. (E11, CI)

371-E. Casting Characteristics of Some Aluminium Alloys. D. C. G. Lees. *Institute of British Foundrymen,* Advance Paper 1004, 1951, 13 pages.

Results of investigation of 16 different Al alloys for founder's fluidity; susceptibility to hot-tearing; susceptibility to internal shrinkage defects; and susceptibility to external shrinkage defects. (E25, Al)

372-E. Die-Casting the "Squirrel Cage" on Small Induction Motors. *Machinery Lloyd* (Overseas Edition), v. 23, May 26, 1951, p. 102-104.

Equipment and procedures. Material is Al. (E13, T1, Al)

373-E. Crucibles in the Aluminium Foundry. (In French and German.) R. Irmann. *Aluminium Suisse,* May 1951, p. 75-81.

Compositions, uses, and relative efficiencies of graphite, carborundum, and Fe crucibles. The Fe crucible is recommended only when protected from molten Al and flux by a surface coating. (E10, T5, C-a, Fe, Al)

374-E. Lead Bronzes and Methods for Casting Them on Steel Bearing Shells. (In Polish.) M. Schneider and S. Balicki. *Prace Glownego Instytutu Metalurgii,* v. 3, no. 2, 1951, p. 115-148.

Investigations on centrifugal, static, and diffusion methods indicate that the latter is unsatisfactory for three different reasons. Experiments led to improvement of the static and centrifugal methods. 18 ref. (E16, Cu, CN, SG-c)

375-E. Induction Furnaces Reduce Die-Casting Rejects. Harry Phillips. *American Machinist,* v. 95, July 9, 1951, p. 136-138.

The furnaces and their use, especially in the melting of Al and Zn. (E13, Al, Zn)

376-E. Recent Progress in the Foundry Industry. Colin Gresty. *Engineering,* v. 171, June 22, 1951, p. 770-771. (A condensation.)

Brief review. (E general)

377-E. Need Stronger Foundry Coke. H. W. Lownie, Jr. *Foundry,* v. 79, July 1951, p. 72-76.

Research which has been conducted since 1942 by Gray Iron Research Institute at Battelle Memorial Institute on effects of coke properties on cupola operation. Test results obtained in a Ford Motor Co. foundry cupola, and results of a letter survey of coke needs of 21 gray-iron foundries. Comparative tests on 1942 and 1950 cokes showed significant differences in tapping temperatures and carbon pickup by the iron. Concludes that many of the foundryman's operating difficulties could be reduced if he were supplied with a larger and stronger coke. (E10, CI)

378-E. Gas Evolution From Molds and Cores. William H. Moore. *Foundry,* v. 79, July 1951, p. 80-87.

Factors influencing the above, including moisture and underbaked cores, and their effect on castings. A relatively simple method of measuring the amount of gas from any sand mix for molds and cores. (E18)

379-E. Wedges Effective in Fastening Pins and Clamps. Pat Dwyer. *Foundry,* v. 79, July 1951, p. 98-99.

Simple devices for fastening foundry flasks together without use of nuts, bolts, or screws. (E17)

380-E. Shell Molded Parts Are Machined 30% Faster. *Steel,* v. 129, July 9, 1951, p. 82.

30-40% of normal machining time is reported to be saved on production of Meehanite machine parts cast by the shell molding, or Croning process. This technique employs thin, shell-like, single-use molds made of sand bonded with Bakelite phenolic resins. (E18, CI)

381-E. Investment Casting. B. G. Mackenzie. *Canadian Metals,* v. 14, June 1951, p. 20-21.

Method for producing small parts from any castable alloy is adaptable to intricate shapes and close tolerances, giving smooth-surface, high-density products. (E15)

382-E. Valve Tappet Castings Manufactured in a French Foundry. René Dulché. *Iron and Steel,* v. 24, June 1951, p. 204-210.

Previously abstracted under similar title in *Foundry Trade Journal.* See item 367-E, 1951. (E11, CI)

383-E. Foundry Mechanization; Successful Application to the Jobbing Foundry. A. S. Beech. *Iron and Steel,* v. 24, June 1951, p. 211-214. (A condensation.)

Procedures, facilities, and layout of mechanized job-lot foundries. (E general)

384-E. Improving Cutting Tool Efficiency. *Machinery Lloyd* (Overseas Ed.), v. 23, June 9, 1951, p. 91-93.

Production by casting of toolsteel. Data show that cast cutters are actually superior to ordinary high-speed steel cutters machined from a solid block. (E11, T6, TS)

385-E. Synthetic Resins in the Foundry. P. G. Pentz. *Metal Industry,* v. 78, June 22, 1951, p. 504-507.

Properties considered necessary in a resin-bonded core sand. (E18)

386-E. "Jacket" Sand Molding. (In French.) *Fonderie,* Mar. 1951, p. 2392-2405.

Advantages of the method when it is necessary to stock large quantities of molds. The molds are released from the flasks after making, and before casting the metal. (E19)

387-E. Introduction of Scrap Steel Into Cupola Furnaces. (In French.) *Fonderie,* Mar. 1951, p. 2406-2408.

Direct introduction into the charge. Chemical and physical properties of the scrap chosen. (E10, A8, CI)

388-E. High-Quality Cast Steel From the Small Converter. (In German.) A. Lincke. *Giesserei,* v. 38 (New ser., v. 4), May 31, 1951, p. 258-259. (E10, CI)

389-E. A New High-Efficiency Automatic Die Casting Machine for Lead, Tin, Zinc, and Aluminum Alloys. (In German.) H. Fleckseder. *Metall,* v. 5, June 1951, p. 247-250.

Dewin's machine, which can be used for low-melting heavy metals and for Al and its alloys with equal success. (E13, Pb, Sn, Zn, Al)

390-E. Gating Principles Applied to Gray Iron Castings Produced on Match Plates. A. J. Howarth. *American Foundryman,* v. 20, July 1951, p. 28-32.

Gating principles and proper and improper applications to several groups. (E22, CI)

391-E. Cast Stainless Steel in Ceramic Molds. H. Czyzewski, R. L. Cook, P. Frederick, and J. P. Jero. *American Foundryman,* v. 20, July 1951, p. 38-39.

Pressed and fired ceramic molds were found to produce stainless steel test bars of good finish, fine detail, and dimensional accuracy. Methods and ceramic compositions used, poured mold characteristics, and test bar properties obtained in the preliminary experiments, and effects of mold preheating. A high alumina-ball clay mixture appeared to be the most satisfactory of the five ceramic compositions tested. (E16, SS)

392-E. Modern Foundry Methods: Planning Mechanization for Medium-Size Gray Iron Foundries. *American Foundryman,* v. 20, July 1951, p. 40-45. (Based on paper by Henry W. Zimnawoda, to be published in *Transactions of the American Foundrymen's Society,* v. 59, 1951.)

Includes brief text, plus numerous diagrams and illustrations. (E11, CI)

393-E. Applying Research Findings in the Malleable Iron Shop. J. E. Rehder. *American Foundryman,* v. 20, July 1951, p. 51-56.

Some of the more important practical aspects of melting and annealing. Effects of tramp metals in the melt, particularly tin, upon properties and annealability of the iron; carbon, silicon and sulfur control; melt additions; acid and basic furnace refractories; and first and second-stage annealing practices. (E11, J23, CI)

394-E. Core Strength Variations Due to Oven Humidities. Harry W. Dietert and Alex L. Graham. *American Foundryman,* v. 20, July 1951, p. 58-59.

How core-strength variations and quantities of binders necessary have been reduced by establishing absolute humidity values in core-oven

atmospheres for baking various core mixtures. (E18)

395-E. Thermal Considerations in Foundrywork. Victor Paschkis. *Foundry Trade Journal*, v. 90, June 21, 1951, p. 661-667; June 28, 1951, p. 699-703, 708.

Previously abstracted from *Institute of British Foundrymen*, Advance Paper 995, 1951. See item 368-E. (E25)

396-E. Casting Characteristics of Some Aluminium Alloys. D. C. G. Lees. *Foundry Trade Journal*, v. 90, June 28, 1951, p. 687-697, 708.

Previously abstracted from *Institute of British Foundrymen*, Advance Paper 1004, 1951. See item 371-E. (E25, Al)

397-E. New Process Quickly Removes Surface Defects on Castings. *Iron Age*, v. 168, July 19, 1951, p. 101.

Sand encrustations, fins, pads, chaplets or chill nails, and other forms of excess metal are removed from castings quickly, easily, and economically by means of an oxy-acetylene method developed by Linde Air Products Co. The new process, called Powder-Washing, utilizes a special blowpipe. An Fe-rich powder is fed through oxy-acetylene preheat flames into a low-velocity oxygen stream where it burns and produces superheated liquid iron oxide. (E24, G22)

398-E. Basic Principles of Die Design; Relating Die Design to Dimensional Accuracy. H. K. Barton and L. C. Barton. *Machinery* (London), v. 78, June 29, 1951, p. 1079-1086.

Correlation of die-casting die design with the standards of dimensional accuracy demanded in the finished product. (Concluded.) (E13)

399-E. Synthetic Resins in the Foundry. *Machinery Lloyd* (Overseas Ed.), v. 23, June 23, 1951, p. 79, 81, 83, 85-86. (From report and recommendations of Sub-Committee T.S. 30, Technical Council, Institute of British Foundrymen.) (E18)

400-E. Trends in Modern Cupola Construction. (In German.) Jorgen Drächmann. *Gjuteriet*, v. 41, June 1951, p. 83-88.

Shows that conditions for equilibrium never exist in cupolas, but that calculations based on incomplete equilibrium are possible. Improvement of present construction. (E10)

F

PRIMARY MECHANICAL WORKING

156-F. The Continuous Merchant Mill. L. C. Sowell. *Iron and Steel Engineer*, v. 28, June 1951, p. 72-76; disc., p. 76.

Aliquippa straight-away 14-in. continuous merchant mill, with some mention of a semi-continuous cross-country mill located at Hazelwood. Advantages and disadvantages of the two types. (F23)

157-F. Rolling Solutions for Specialty Steels. Maxwell L. Bible. *Iron and Steel Engineer*, v. 28, June 1951, p. 91-93; disc., p. 93-94.

Selection of rolling lubricants and coolants for stainless steels. (F1, SS)

158-F. Light-Alloy Extrusions. E. Austyn Reynolds. *Light Metals*, v. 14, June 1951, p. 309-311.

Procedures and equipment for production. (F24, Al)

159-F. How to Push Metal Around for Profit. *Modern Industry*, v. 21, June 15, 1951, p. 40-45.

Recent developments in production of automotive and aircraft parts by hot and cold forging, extrusion, and stretch-press forming, and large economies thereof. (F22, F24, G9)

160-F. England's New Aluminium Rolling Mill: 50,000 Tons of Sheet and Strip per Year. *Modern Metals*, v. 7, June 1951, p. 45-48. (F23, Al)

161-F. Precision Rolling Thin-Gage Magnetic Alloys. *Steel*, v. 128, June 25, 1951, p. 114.

New Sendzimir cold strip mill capable of rolling ultrathin alloy ribbon stock in widths up to 8½ in. from a maximum thickness of 0.025 in. down to 0.0005 in. (F23, SG-n, p)

162-F. Wire for Fasteners. S. W. McDermott. *Wire and Wire Products*, v. 26, June 1951, p. 489-491, 509-510.

Kinds of steel wire best suited to cold-heading work. Equipment and procedures. Macrographs show structures of different billets and wire drawn from them. Presence of an extensive rimmed area is desirable. (F28, T7)

163-F. The Extrusion of High-Purity Magnesium Alloys. H. G. Warrington. *Canadian Mining and Metallurgical Bulletin*, v. 44, June 1951, p. 424-428.

Reduction of number of alloys produced from 7 to 4 as an aid to economical production at Dominion Magnesium, Ltd., Canada. Applications and future prospect. (F24, Mg)

164-F Producing Tube and Section by Using Electric Resistance Welding. *Machinery Lloyd* (Overseas Edition), v. 23, May 26, 1951, p. 99-101.

Equipment and procedures. (F26, ST)

165-F. A New Approach in the Preparation of Forging Blanks. H. E. Hows. *Metal Treatment and Drop Forging*, v. 18, June 1951, p. 274-278.

New type of equipment called the "Reduceroll," by which considerable economies in die costs are achieved. One pair of 3-groove rolls have handled over 200,000 billets without appreciable wear. Equipment and some of its products. (F22)

166-F. Empirical and Graphical Method for Determination of Force Applied During Drawing. (In Polish.) M. Schneider and R. Wusatowski. *Prace Glownego Instytutu Metalurgii*, v. 3, No. 1, 1951, p. 11-16.

Several diagrams showing relationship of drawing force, coefficient of deformation efficiency, Brinell hardness, yield strength, and reduction in area, based on Lueg and Pomp's results. Empirical formula for calculation of drawing force chosen. Results of experiments on low-carbon steel are in agreement with this formula. By its use, a nomogram for rapid calculation of drawing force was prepared. (F27)

167-F. Metal Flow, Elongation, and Spread in Regular Sections. (In Polish.) Z. Wusatowski and A. Wojtylak. *Prace Glownego Instytutu Metalurgii*, v. 3, No. 1, 1951, p. 23-46.

Theoretical fundamentals for quantitative determination of metal flow during rolling of regular sections. Calculations are based on Z. Wusatowski's formulas for coefficients of elongation and spread, and on A. Lendl's formula for coefficient of mean elongation of total cross-section. Metal flow during rolling of regular sections, such as equal angles, tees, channels, and double-tees was calculated. Comparison between calculated and obtained dimensions after a single rolling pass indicated good agreement. (F23)

168-F. How to Approach Shell Forging Problems. K. N. Mills. *Iron Age*, v. 168, July 5, 1951, p. 90-94.

Limitations and problems associated with the various forging methods used in the production of artillery shells. How solution to such problems as forging symmetry, cavity and surface defects, and cracks can be achieved by careful analysis and application of basic engineering principles. (F22, T2, ST)

169-F. Forging Clutch Pedals at Dodge Plant. John C. McComb. *Steel Procesing*, v. 37, June 1951, p. 273-275. (F22, T21)

170-F. Steel Processing Forum: Disputes Claims on Counter-Blow Forging Hammer. Macdonald S. Reed. *Steel Processing*, v. 37, June 1951, p. 293-296.

Comments on the article, "The Counterblow Forging Hammer—Its Design and Applications," by Bernard Anscher in *Steel Processing*. See item 131-F, 1951. (F22)

171-F. Kaiser Steel's New 86-Inch Hot Strip Mill. *Western Metals*, v. 9, June 1951, p. 38-39.

Equipment illustrated. (F23)

172-F. Thin Sheets; Hot Mill Technique in Pack Rolling. John H. Mort. *Iron and Steel*, v. 24, June 15, 1951, p. 235-241.

Approximate dimensions of the sheets referred to are widths of 2-3 ft., lengths of 6-10 ft., and thicknesses of 0.0087-0.0123 in. The technique is also applicable in large measure to manufacture of sheets 0.004-0.006 in. thick. Galvanizing procedure and details of rolling practice, including calculations. (F23, L16, CN, Zn)

173-F. The Effect of Tension on Torque and Roll Force in Cold Strip Rolling. W. C. F. Hessenberg and R. B. Sims. *Journal of the Iron and Steel Institute*, v. 168, June 1951, p. 155-164.

Problem was studied on the BISRA experimental rolling mill. Simple approximate formulas for calculating effect of tension on roll force and torque are proposed, and comparison is made between calculated and experimental results. Difficulties inherent in more elaborate methods of calculation. Tables show results of tests on annealed and prestrained mild steel. 11 ref. (F23, CN)

174-F. The American Non-Ferrous Metals Industry; Productivity Team Report on Wire and Other Materials. *Wire Industry*, v. 18, June 1951, p. 528-532, 535. (A condensation.)

Wiredrawing, rod rolling, bright annealing, tinning, cold rolling of commutator sections, etc., of copper and steel. (F28, F23, F27, Cu, ST)

175-F. Friction in Wire Drawing. H. G. Baron and F. C. Thompson. *Wire Industry*, v. 18, June 1951, p. 543-546, 549-550.

Previously abstracted from *Journal of the Institute of Metals*. See item 79-F, 1951. (F28, Cu)

176-F. Drawing of Wire From Steels Contaminated With Chromium or Copper. (In German.) Wilhelm Püngel. *Archiv für das Eisenhüttenwesen*, v. 22, May-June 1951, p. 143-148.

A gradual increase in the Cr and Cu contents of steel wire because of the use of alloy scrap has resulted in greater tendency toward crack formation during wiredrawing. Effects of percentage Cu and Cr, annealing and patenting procedure, of Ni additions, of degree of drawing after patenting, of steel-production process (openhearth or electric), of hot working, etc., on crack formation. (F28, Q general, CN)

177-F. The Effect of McQuaid-Ehn Grain Size on the Drawing Properties of Patented Steel Wire. (In German.) Philipp Günther. *Archiv für das Eisenhüttenwesen*, v. 22, May-June 1951, p. 149-154.

Drawing tests with steels having coarse, medium, and fine-grained austenite showed that grain size has little effect on properties of the wires, provided that total reduction in cross section does not exceed 85%. If the degree of deformation exceeds this amount, coarse-grained

steels are superior to the others in that the resulting wires are stronger and tougher. (F28, M27, CN)

178-F. Rolls and Rolling. Part XXVII. Bulb Angles. E. E. Brayshaw. *Blast Furnace and Steel Plant*, v. 39, July 1951, p. 800-812.

The bulb angle, which is an unequal leg angle with a bulb attached to the end of the long leg, is produced in two series, the shipbuilding type and the car-building type. Rolling methods and roll-pass diagrams. (F23)

179-F. Manufacture of Resistance-Welded Steel Tubing in America. *Engineer*, v. 191, June 29, 1951, p. 873-876.

Operations at Electricweld Tube Div., Jones and Laughlin Steel Corp., Oil City, Pa. (F26, ST)

180-F. Rolling. J. Lomas. *Machinery Lloyd* (Overseas Ed.), v. 23, June 23, 1951, p. 87, 89-90.

Compares the rolling of steel with forging. Changes in the properties of a material with rolling. Other practical factors concerned with the rolling process. Nomenclature and classification of rolling mills. (F23)

181-F. (Book) **Impact Die Forging.** 70 pages. Chambersburg Engineering Co., Chambersburg, Pa. $1.50.

The Chambersburg Engineering Co. with the cooperation of the School of Engineering of Princeton University, has prepared a series of charts that form the main part of this booklet. Organized primarily for the convenience of instructors in technical and engineering schools either to form the basis of their courses or to supplement such courses. (F22)

G

SECONDARY MECHANICAL WORKING

228-G. Spinning Head Sends Head Cost Spinning. Charles J. Sabo. *American Machinist*, v. 95, June 25, 1951, p. 108-109.

Equipment and procedures for production of swivel-hook assembly. 75% reduction in costs results from use of a spinning attachment on a 4-slide machine. Material is steel. (G13, CN)

229-G. Developments and Present Status of Thread Rolling. A. Bradford Reed. *American Society of Mechanical Engineers*, Advance Paper 50-F-19, 1950, 16 pages.

Development of thread rolling from its origin to the present, with particular emphasis on developments of the last few years. Desirable results that can be obtained from use of the operations, limitations inherent in the process. (G12)

230-G. Drilling Cast Iron With Carbide Tipped Tools. Fred W. Lucht. *Automotive Industries*, v. 104, June 15, 1951, p. 98, 102, 105.

(G17, CI, C-n)

231-G. Plastic Tools for Light Metals. Gilbert C. Close. *Light Metal Age*, v. 9, June 1951, p. 8-10.

Use at Northrop Aircraft Inc., for forming tools for Al and Mg and their alloys. (G general, Al, Mg)

232-G. How to Drill Cast Iron With Carbide Twist Drills. Fred W. Lucht. *Machine and Tool Blue Book*, v. 47, July 1951, p. 125-126, 128-130, 132, 134.

(G17, T5, CI, C-n)

233-G. Hot Metal Machining. Sam Tour. *Metal Progress*, v. 59, June 1951, p. 793-794. (Based on comments made by the author at one of the high-production sessions at the Oct. 1950 ASM convention.)

Technique makes possible metal-removal rates for low-carbon, medium-carbon, Cr, Ni, and stainless steels 3-4 times over those possible with conventional machining. Certain of the high-temperature alloys that are supposed to be difficult to machine are readily machined with this method. For example, Allegheny Ludlum Steel Corp.'s S-816 was machined at a rate of 270 cu. in. per hr., as compared with the usually recommended metal-removal rate of 2.1 cu. in. per hr. (G17)

234-G. Fundamentals of the Working of Metals. Part XXIII. Tandem Die Forming. George Sachs. *Modern Industrial Press*, v. 13, June 1951, p. 6, 8, 34.

Design and applications of tandem dies. (G6)

235-G. The Hardness of Oxygen-Cut Surfaces and Their Softening by Heat Treatment. Gottfried Kritzler and Hermann Thier. *Welding Journal*, v. 30, June 1951, p. 282s.

Condensed from paper in *Stahl und Eisen*. See item 150-G, 1951. (G22, J23, CN, AY)

236-G. Economical Motor Car Body Production. H. R. Smith. *Machinery* (London), v. 78, June 7, 1951, p. 941-947.

Equipment and procedures of Kaiser-Frazer Corp. Forming and other press operations and welding are emphasized. (G1, K general, T21, CN)

237-G. A Review of Impact Extrusion and Some Related Processes. George Sachs. *Sheet Metal Industries*, v. 28, June 1951, p. 533-538, 546.

Principles and processes. (G5)

238-G. How to Mill, Roll, Grind Threads for Production. William M. Stocker. *American Machinist*, v. 95, July 9, 1951, p. 145-168.

Special report compares methods and apparatus used in above processes for screw-thread production. (G17)

239-G. Using Oxyacetylene Processes for Fabricating Piping. E. P. Auler. *Heating, Piping & Air Conditioning*, v. 23, July 1951, p. 102-105.

Use for cutting, shaping, and heating of steel pipe during its fabrication into systems. (G22, CN)

240-G. Basic Facts Concerning the Use of Coated Abrasive Belts for Weld Grinding and Finishing. Ralph William Reed. *Industry & Welding*, v. 24, July 1951, p. 33-34, 37, 76-77.

(G18)

241-G. Unusual Multislide Machine Shown at Festival of Britain. *Iron Age*, v. 167, June 28, 1951, p. 70.

In addition to forming stations for wire products, the machine includes a press station for working strip up to ¾ in. wide. The standard machine has 4 slides mounted, but any number up to 6 radial slides can be accommodated, each separately adjustable for timing, stroke, and dwell. (G1)

242-G. Machine Hot-Forms Tubing Into Complex Parts. John Kolb. *Iron Age*, v. 167, June 28, 1951, p. 78-80.

Equipment and procedures by which tubing up to 10 in. in diam. is precision-sized and then hot formed into complex, finished parts. A combination of convergent-divergent sections, graduated diameters, wall thicknesses, and closed ends is obtainable. To date, carbon steels, alloy steels, certain stainless steels, and Al alloys 14S and 61S have been successfully formed by the Westin machine. Braces and struts for aircraft landing and flap-control gear, rocket and "jato" bodies with convergent-divergent nozzles, compressed-gas bottles, completely closed tubes, conveyor rolls, and other parts requiring reduced sections with heavier walls have been fabricated in quantity. (G general)

243-G. Shotpeening as a Factor in the Design of Gears. John C. Straub. *Mechanical Engineering*, v. 73, July 1951, p. 565-569.

See abstract of "Balanced Gear-Tooth Design," *Machine Design*. See item 222-G, 1951. (G23, T7)

244-G. Cold Forming of Low Carbon Steel. Part IV. (Concluded.) Lester F. Spencer. *Steel Processing*, v. 37, June 1951, p. 280-283.

Factors influencing selection of lubricant for forming operations, types of lubricants used in press drawing metal, press equipment and tooling, choice of toolsteels, and die materials. 27 ref. (G21, TS, CN)

245-G. Machinability Measurements on Constant-Pressure Lathes. Francis W. Boulger. *Tool Engineer*, v. 27, July 1951, p. 25-30.

The property of "machinability" is defined and discussed. Test equipment for its measurment. Charts show correlation between machinability ratings and various laboratory testing methods. 10 ref. (G17, ST)

246-G. Hydro-Sizing. E. A. Schrodeck. *Western Machinery and Steel World*, v. 42, June 1951, p. 72-73.

Fabrication of an aircraft fuel storage tank, and problems of welding, trimming, and hydraulic forming and sizing operations. (G1, K1)

247-G. Measuring Tool Loads. *Western Machinery and Steel World*, v. 42, June 1951, p. 78.

Equipment and methods. (G17)

248-G. Wood Manufacturing Co. Gets Low Cost and Design Flexibility With Welded Components. Fred M. Burt. *Western Metals*, v. 9, June 1951, p. 48-49.

Components used by the above company, which manufactures road mixers. Use of torch cutting, gas and arc welding operations. (G22, K1, K2)

249-G. Deep Draw Aluminum Barrels; A Light Container for Fluid Packaging. Hugh G. Jarman. *Canadian Metals*, v. 14, June 1951, p. 42, 44.

Five deep-drawing operations produce the barrel halves which are then annealed and welded. (G4, Al)

250-G. Shot Peening; Effect on the Fatigue Properties of 18-8 Chromium-Nickel Steel. W. E. Bardgett and F. Gartside. *Iron and Steel*, v. 24, June 1951, p. 195-197.

Experimental data are charted, tabulated, and discussed. (G23, Q7, SS)

251-G. Hot Brass Pressing. *Machinery* (London), v. 78, June 21, 1951, p. 1039-1044.

Modern practice and equipment. (G1, Cu)

252-G. Oxy-Acetylene and Oxypropane Flames Applied to Processes of Oxygen Cutting. (In French.) R. Credeville. *Journal du Four Electrique et des Industries Electrochimiques*, v. 60, May-June 1951, p. 60-65.

Relative efficiency of the two. It was concluded that oxyacetylene is much the cheaper, considering the relative amounts of O_2 used, and the cutting time required. Data on cutting of mild steel using the two gases are comparatively charted and tabulated. (G22, CN)

253-G. Coolant Flood Improves Carbide Performance. Wackch Iwascheff. *Iron Age*, v. 168, July 19, 1951, p. 112-114.

Tests made during turning of 40,000 carbon steel shell forgings with automatic lathes prove the value of an enveloping flood of coolant in improving carbide tool performance. Surface speed was increased, surface finish improved, and tool life increased as much as 10 times. (G21, G17, CN, C-n)

254-G. (Book) **Principles and Methods of Sheet-Metal Fabricating.** George Sachs. 526 pages. 1951. Reinhold Publishing Corp., 330 W. 42nd St., New York 18. $10.00.

Principles of numerous sheet-metal forming methods. Theory of deformation of sheet metal and tubing; metallurgical effects produced in stamping, drawing, extruding, bending; practical operations involved; design of parts and dies, and the production equipment used. (G general)

255-G. (Book) **Punching, Shearing, Bending.** William C. Tucker. 80 pages. Buffalo Forge Co., 490 Broadway, Buffalo, N. Y. $3.00.

A pocket-size handbook intended for men operating metal-fabricating machines; for those responsible for keeping them in proper working order; and for designers of work for these types of machines. (G2, G6, G15)

256-G. (Book) **Tool Engineering.** A. P. Gwiazdowski. 306 pages. C. C. Nelson Publishing Co., Appleton, Wis.

A broad survey of machines and methods used in American industry today. Production of a typical part is used to maintain logical sequence in discussing processing and machining operations. Various machining, inspection, and gaging methods; heat treatment of ferrous alloys; and welded assembly of jigs and fixtures. (G17, T6)

257-G. (Book) **Zerspanung und Werkstoff.** (Machining and Materials.) Ed. 2. E. Brödner. 256 pages. 1950. Verlag W. Girardet, Essen, Germany. 18.50 Dm.

The principles of machining and machinability. Effects of cutting fluids and coolants and the various machining operations. Tool materials —ferrous, nonferrous, and plastic, including the various toolsteels, hard metals, and diamonds. (G17, TS)

H

POWDER METALLURGY

59-H. British Wire Gear Maker Adds Powder Shop. John Rigby. *Iron Age,* v. 167, June 21, 1951, p. 90-91.

Powder metallurgy has taken gear and pinion business away from shaped wire in America. British wire gear maker has followed suit by installing a powder fabricating shop. On small, complicated parts, powdered metal has cut costs 50%. Bulk of work has been with Fe powder. (H general, T7, Fe)

60-H. Sintered Contact Materials. Part I. (In Polish.) A. Krupkowski, W. Rutkowski, and S. Stolarz. *Prace Glownego Instytutu Metalurgii,* v. 3, No. 2, 1951, p. 149-160.

Composite electrical contact materials based on W-Cu and W-Ag were investigated. Effects of composition, particle size, applied pressure, temperature, and time of sintering on density, hardness, electrical conductivity, and arcing resistance. Best results were obtained for 60-70% W, rest Cu or Ag. It was found advantageous to use coarser W powders (50-300 μ range), obtained by mechanical comminution of sintered W. Compacting pressures above 15 tons per sq. cm., sintering temperature of 1000-1100° C., and sintering times of 3-4 hr. in dry H_2 are recommended. (H15, W, Cu, Ag)

61-H. Rate of Sintering of Copper Under a Dead Load. F. N. Rhines and H. S. Cannon. *Journal of Metals,* v. 3, July 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 529-530.

Application of a static load to a Cu powder compact during sintering at an elevated temperature accelerates the rate of sintering in such a way that a given load induces the same proportional increase in rate for all times of sintering. Shows that sintering under a load is like creep under a fixed load in that stress required to accomplish a given degree of densification is proportional to the logarithm of the sintering time. (H15, Cu)

62-H. A Method for Annealing Metal Powders Without Sintering. F. W. Batchelder and H. E. Stauss. *Review of Scientific Instruments,* v. 22, June 1951, p. 396-397.

A method for maintaining the separation of the component particles during the annealing of a metallic powder. The powder is mixed with a large quantity of a second powder which is chemically inert with respect to the metal, the mixed powders are annealed, and the metal separated by dissolving the inert powder. In this way, Au, Ag, and Fe powders were annealed in NaCl without sintering. (H12, Au, Ag, Fe)

63-H. Theory and Practice of Pressing Pulverized Materials. (In German.) Carl Ballhausen. *Archiv für das Eisenhüttenwesen,* v. 22, May-June 1951, p. 185-196.

With the aid of the analogy of a rubber belt over a pulley and held down by different sized weights on the two ends, an equation is derived for relationship between mold friction and applied pressure, resulting in unequal pressure distribution. Measurements on rubber, Pb, Fe, and Cu confirmed validity of the equation. (H14)

64-H. On the Combining Process of Metals. (In German.) E. Schwarz-Bergkampf. *Berg-und Hüttenmännische Monatshefte,* v. 96, May 1951, p. 116-118.

Shows that passing current (and consequently electrons) between two pieces of metal always effects a combination or transfer of metal, and that this principle can profitably be applied to powder metallurgy. Experiments prove that a slight electric charge passed through pressed and sintered samples increases degree and uniformity of their strength. 6 ref. (H11)

J

HEAT TREATMENT

177-J. Heat Treating Engine Parts. *Industrial Gas,* v. 29, June 1951, p. 8-10.

Use of gas in heat treating marine diesel engines at Nordberg Mfg. Co., Milwaukee. (J general, ST)

178-J. New Quenching Methods Avoid Cracking—Improve Performance. J. H. Chapman. *Metal Treating,* v. 2, May-June 1951, p. 4-5.

Previously abstracted from original in *Western Metals.* See item 170-J, 1950. (J26, ST)

179-J. Heat Treatment of Plastic Molds. David R. Edgerton. *Metal Treating,* v. 2, May-June 1951, p. 9-11. (Reprinted from *Heat Treating Hints,* Lindberg Engineering Co., Chicago.)

Recommendations for heat treatment of molds for plastic articles. These cover the four general grades which are used: plain-carbon and alloy carburizing steels; through-hardening alloy steels; and stainless and heat-resistant steels. (J general, T5, ST)

180-J. Large Scale Production Heat-Treatment at the Standard Motor Co., Ltd.. Banner Lane Works, Coventry. L. H. Williams. *Metal Treatment and Drop Forging,* v. 18, June 1951, p. 257-269, 271.

Equipment and procedures. (J general, A5, ST)

181-J. Hardenability and Heat Treatability of High-Grade Structural Steels. (In Czech.) Frantisek Sicha. *Hutnické Listy,* v. 6, Feb. 1951, p. 58-70.

A simple experimental method based on a survey of the world's technical literature and the author's experiments. Influence of steel composition and method of deoxidation on grain size was determined statistically. Results indicate that Czechoslovak structural steels of the same austenitic grain size possess greater hardenability than American steels. A new method of calculating hardenability from chemical composition and austenitic grain size is proposed, based on the results of statistical analysis of numerous Jominy tests. 22 ref. (J26, ST)

182-J. A Study of Natural Aging and the Application of Tests for Weldability of Steels. (In Czech.) Frantisek Poboril and Frantisek Sicha. *Hutnické Listy,* v. 6, Apr. 1951, p. 158-165.

By long-time tests of natural aging of low-carbon steels quenched in water from just below the AC_1 point, the existence of precipitation hardening was demonstrated. Other tests were made on natural aging following cold deformation. This process resulted in only a small increase in hardness. Statistical evaluation of results of comparative tests on weldability of 125 low-carbon steels showed that aging after thermal treatment and after cold deformation gives fundamentally different results for a number of steels. (J27, K9, ST)

183-J. Wire Annealing Furnace Fits Low Headroom. W. J. Krailing. *Iron Age,* v. 168, July 12, 1951, p. 93-95.

Special wire and rod annealing furnace for brass mill designed with a pan-pull transfer car loading system to eliminate overhead handling. Fork-lift trucks transport the coils and load the pans. (J23, Cu)

184-J. Boron Steels in the Present Emergency. P. R. Wray. *Steel,* v. 129, July 2, 1951, p. 78-82.

Initial production heats of five new series of lean-alloy "needled" structural steels show hardenability exceeding laboratory predictions, confirming experiences with thousands of tons of World War II analyses. Hardenability data are charted. (J26, ST)

185-J. Aging of Steel and Its Relationship to Oxygen and Nitrogen. Ulrich Engelbert. *Australasian Engineer,* Apr. 7, 1951, p. 73-79.

The phenomenon of aging or, more precisely, the quench and strain aging of steel in relation to its O_2 and N_2 content. Emphasizes problems of precipitation and segregation in mild steels. Mentions briefly steelmaking methods designed to avoid susceptibility of mild steel to aging. 21 ref. (J27, N7, CN)

186-J. Carbo-Nitriding. *Iron and Steel,* v. 24, June 1951, p. 232.

Brief description of the process; includes furnace diagram. (J28, ST)

187-J. Heat Treatment in the Production Line. *Machinery Lloyd* (Overseas Ed.), v. 23, June 9, 1951, p. 100-103, 105, 107, 109.

Equipment for dielectric, induction, electric resistance, and gas heating in the form of a "push-button" machine which can be brought into the workshop alongside the machine tool and which can be tended by unskilled labor. (J general)

188-J. Present-Day Ideas on the Annealing of Special Steels Before Machining. (In French.) M. Remy. *Circulaire d'Informations Techniques,* v. 8, No. 2, 1951, p. 193-218.

Theoretical and practical aspects. Data on a variety of carbon, alloy, and stainless steels, are charted. Photomicrographs and 16 ref. (J23, CN, AY, SS)

189-J. Influence of Moderate Cold Working on the Kinetics of Hardening of Solid Solutions of Aluminum. (In French.) Aurel Bergnezan. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 232, Apr. 23, 1951, p. 1560-1562.

As applied to cold working of aged supersaturated solid solutions of Al. Results indicate, contrary to the usual theory that cold working accelerates hardening, that there is a threshold of cold working, below which this acceleration does not take place. (J27, Al)

190-J. Thermal Treatment Accompanying Cementation. (In French.) J. Pomey. *Metaux: Corrosion-Industries,* v. 26, Mar. 1951, p. 97-125.

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191-J. Steels for Surface Hardening. (In French.) Hans Buhler. *Métaux: Corrosion-Industries,* v. 26, Apr. 1951, p. 179-183. (Translated from *Werkstatt und Betrieb,* v. 83, No. 9, 1950, p. 406-408.)

Present status in Germany. (J28, ST)

192-J. The Present Status of Annealing Malleable Iron in Gas Atmospheres. (In German.) P. F. Hancock. *Giesserei,* v. 38 (new ser., v. 4), May 31, 1951, p. 245-255.

Limited to British procedures and equipment. (J23, CI)

193-J. Role of Boron Steels in Present Emergency. P. R. Wray. *SAE Journal,* v. 59, July 1951, p. 46-52.

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194-J. The Growth of Aluminum Alloys From Annealing and Use at Elevated Temperatures. (In German.) A. Leon. *Berg-und Hüttenmännische Monatshefte,* v. 96, May 1951, p. 118-119.

Briefly reviews published experiments. 5 ref. (J23, Al)

195-J. Carburizing, Gas-Carburizing; A Specific Treatment for Steel. (In Dutch.) C. H. Luiten. *Smit Mededelingen,* v. 6, Apr.-June 1951, p. 43-47.

Development and practical application of case hardening processes. Pack carburizing, salt-bath carburizing, cyaniding and nitriding; gas carburizing, carbonitriding, and nitriding as well as surface hardening by means of special compounds. Includes illustrations of case-hardening furnaces. (J28, ST)

K

JOINING

377-K. Stainless Orange Peel Holds Nitrogen. *American Machinist,* v. 95, June 25, 1951, p. 129.

Welded sections of spherical tank for compressed-nitrogen storage are said to resemble peel of an orange. Stainless-steel plates are joined by heliarc welding. (K1, T26, SS)

378-K. Welding a 10-Story VA Hospital. R. A. Phelps. *Engineering News-Record,* v. 146, June 21, 1951, p. 32-35.

Cost data showing differences in various items between welded and riveted construction. Typical welded units. (K general, T26, CN)

379-K. Rotary Fixture Welds a Plowshare a Minute. *Iron Age,* v. 167, June 21, 1951, p. 98.

Use of an 8-place rotary fixture has increased production of welded plowshares by 10%. Plow consists of a die-cut gunnel and a forged share, which are welded together. The rotary fixture holds the parts of the plowshare in position and moves them under a Unionmelt welding head at 19.1 ipm. (K1, T3, CN)

380-K. The Magnesium Star. *Light Metals,* v. 14, June 1951, p. 293-298.

Fabrication procedures on four-pointed Mg star suspended over the main approach to the Festival of Britain. Main emphasis on adhesive joining of sandwich panels and on arc welding. (K1, K12, T9, Mg)

381-K. Defective Iron Castings Saved by Repair Welding. *Materials & Methods,* v. 33, June 1951, p. 86-88.

Procedures and applications. (K general, CI)

382-K. Welding Armored Vehicles. *Metal Progress,* v. 59, June 1951, p. 848, 850, 852. (Condensed from "Evolution of Welded Armored Fighting Vehicles", R. J. Fowler and L. F. Denaro.)

Previously abstracted from *Transactions of the Institute of Welding,* v. 9. See items 22-468 and 22-541, 1946. (K1, T2, CN)

383-K. Induction Soldering. *Sheet Metal Industries,* v. 28, June 1951, p. 566.

High-frequency heating used in soldering sink-type water heaters. (K7, Cu)

384-K. Continuous Welded Structures, Abbey Works, Port Talbot. W. S. Atkins. *Transactions of the Institute of Welding,* v. 14, Apr. 1951, p. 28-38; disc., p. 38-43.

Design and construction of a new steelworks in South Wales. (K1, T26, CN)

385-K. The Uses and Abuses of Arc-Welding Electrodes. I. C. Fitch. *Transactions of the Institute of Welding,* v. 14, Apr. 1951, p. 45-52; disc., p. 52.

Previously abstracted from *Sheet Metal Industries,* item 259-K, 1951. (K1, ST)

386-K. Heavy Fabrication at Chepstow. Rolt Hammond. *Welding & Metal Fabrication,* v. 19, May 1951, p. 160-166; June 1951, p. 210-212.

Weld fabrication of heavy equipment by a British firm. (K general, CN)

387-K. Production of Domestic Heating Equipment. *Welding & Metal Fabrication,* v. 19, June 1951, p. 198-201.

Welding and fabrication procedures. (K general, G general, CN)

388-K. Fabrication of Corrosion-Resistant Metals; The Importance of Metallurgical Control. J. F. Lancaster. *Welding & Metal Fabrication,* v. 19, June 1951, p. 202-209.

Major emphasis is on welding. (K general, SG-h)

389-K. Welding and Its Effect on the Corrosion Resistance of Stainless Steel. E. W. Hopper. *Welding Journal,* v. 30, June 1951, p. 503-507.

Welded stainless steel failures due to corrosion and methods of minimizing such failures. The use of water cooling is recommended. (K1, R1, SS)

390-K. Tungsten-Thoria Electrodes for Inert Arc Welding. N. A. Chapin, J. D. Cobine, and C. J. Gallagher. *Welding Journal,* v. 30, June 1951, p. 529-531.

Electrodes overcome the erratic transition of the arc from the high-frequency spark to the actual arc. Initiation of a tungsten arc under typical welding conditions in argon is shown in consecutive frames of a movie taken at 50 frames per sec. (K1, W, Th)

391-K. A Welded Factory Building In Italy. *Welding Journal,* v. 30, June 1951, p. 534-535.

Transverse and longitudinal sections of the building and details of the column and roof structure. (K26)

392-K. Braze-Welding Furnace and Boiler Sections. E. E. Cashen. *Welding Journal,* v. 30, June 1951, p. 544-545. (K8, C1)

393-K. Current Welding Research Problems. *Welding Journal,* v. 30, June 1951, p. 273s-282s.

Compilation made for university research workers listing current welding research problems and suggestions as to the needs of industry. (K9)

394-K. Explosion Bulge Test Studies of the Deformation of Weldments. Carl E. Hartbower and William S. Pellini. *Welding Journal,* v. 30, June 1951, p. 307s-318s.

Semiworks-scale testing of full welds in heavy plate under combined stress conditions such as prevail in structures and the significance of the findings in evaluation of weld performance. (K9, ST)

395-K. Flash Butt Welding of Steel. L. Sanderson. *British Steelmaker,* v. 17, Apr. 1951, p. 207-211; May 1951, p. 255-259; June 1951, p. 320-323.

Part I: How the process came to be adopted commercially and the component parts of a typical welding machine. Metallurgical aspects including hardness variations in different kinds of steel. Application of the process to manufacture of twist drills. Part II: Process, explaining the nature of the characteristic flashing action. Various uses of preheating as a preliminary to butt welding. The part played by mechanical pressure in the process. Part III: Importance of careful design, choice of suitable materials, correct alignment, and other factors. Advantages, and details of composition and care of the electrodes and jaws, and choice of equipment. Refers briefly to high-speed valve-controlled butt welding. (K3, ST)

396-K. Automatic Machines Weld 120 Steel Assemblies Hourly. Herbert Chase. *Industry & Welding,* v. 24, July 1951, p. 28, 30, 74.

Process used in production of Dynaflow transmissions by Buick Motor Div. Material is SAE 1008 hot rolled steel; submerged-arc welding is used. (K1, CN)

397-K. Quick Test Eliminates Defects in Brazing. *Industry & Welding,* v. 24, July 1951, p. 38, 66.

How impurities are detected in cupro-nickel alloys by heating coupons in a combustion-tube furnace. Good brazability is indicated by a bright surface. (K8, Cu)

398-K. Welded Design Features Stainless Steel Equipment for Armed Services. Arthur R. Hill. *Industry & Welding,* v. 24, July 1951, p. 40-41, 43-44, 73.

Shielded-arc welding of stainless steel dishwashers by Peters-Dalton, Inc., Detroit. (K1, SS)

399-K. Aluminum Tanks Welded in Unique Fixtures. T. E. Imholz. *Iron Age,* v. 168, July 5, 1951, p. 87-89.

Fixtures which facilitate arc welding of Al aircraft wingtip gas tanks at Republic Aviation. Both hand and automatic Heliarc welding methods are employed, with and without filler rods. (K1, Al)

400-K. Hints for Silver-Brazing of Stainless Steel. *Linde Tips and Oxu-Acetylene Tips,* v. 30, July 1951, p. 53-56.

(K8, SS)

401-K. Rail Joint Welding. A. E. Belton, V. D. Hanson, J. S. Gelston, and H. O. Zimmerman. *Mining Congress Journal,* v. 37, June 1951, p. 49-52.

A committee report describing several processes of rail welding for coal mine tracks, giving methods, costs, and service records. (K general, T23, CN)

402-K. High Strength Fastening. Gilbert C. Close. *Modern Machine Shop*, v. 24, July 1951, p. 102-106, 108, 110, 112, 114, 116-117.

Various methods of joining Al alloy structures to withstand stresses imposed by supersonic flight speeds. Confined entirely to use of rivets, lockbolts, and other mechanical fastening devices. (K13, Al)

403-K. A Timing Control for Small Spot Welders. M. H. Nichols. *Review of Scientific Instruments*, v. 22, June 1951, p. 372-373.

Circuit parameters and components. (K3)

404-K. Application of Electron-Diffraction to Bonding Problems. J. W. Malden. *Transactions of the Institution of the Rubber Industry*, v. 27, June 1951, p. 175-178.

Use of the electron-diffraction technique in eliminating a cause of failure in brass-to-rubber bonding. A tentative explanation of the mechanism of the bonding process is suggested. 12 ref. (K11, Cu)

405-K. 1950 Facts and Figures. *Welding Engineer*, v. 36, Mid-June 1951, p. 5-13, 16.

Statistical review of the welding industry. (K general, A4)

406-K. Die Welding by the Metal Arc. Arthur R. Butler. *Welding Engineer*, v. 36, June 1951, p. 28-30; July 1951, p. 32-35.

Recommended procedures. First installment: Factors influencing hardness. Concluding part: recommended procedures. (K1, TS)

407-K. Recent Advancement in Structural Welding. LaMotte Grover. *Western Machinery and Steel World*, v. 42, June 1951, p. 86-88, 94.

A review. (K general, T26, CN)

408-K. Copper Furnace Brazing's Place in Forming Aircraft Components. Howard Eubank and George F. Brown. *Western Metals*, v. 9, June 1951, p. 42-44.

Advantages of the process. Specimen components are illustrated. (K8)

409-K. Submerged Arc Unit Welds Pipe-Line on Right-of-Way. C. A. Renton. *World Oil*, v. 133, July 1, 1951, p. 211-212, 218.

New light, portable welding unit is mounted on a tractor and used to weld 26-in. pipe into 2, 3, and 4-joint sections. Tests proved the welds equal in quality to the longitudinal pipe welds made by the same process at the pipe mill. (K1, CN)

410-K. Welding Practice in Britain. C. G. Bainbridge. *Canadian Metals*, v. 14, June 1951, p. 34-36, 38, 46-47.

A progress report on the application of welding to ships, structural steel, and locomotive construction. (K general, T26, CN)

411-K. Influence of the Atmosphere and of Heat Treatment on the Electric Welding Process. (In French.) H. G. Geerlings. *Revue de la Soudure; Lastijdschrift*, v. 7, No. 1, 1951, p. 16-24.

Effect of method of production of steel and type of electrode (coated or uncoated) on amount of N_2 and O_2 absorbed by the weld; also influence of heat treatment immediately after welding. Optimum conditions of heat treatment. (K1, J general, ST)

412-K. Angle Welding in a Vertical Position. (In French.) M. Mouton. *Revue de la Soudure; Lastijdschrift*, v. 7, No. 1, 1951, p. 25-34.

A new economical method applicable to ST-52 structural steel, using FP heavily coated electrodes for deep-penetration welding, MP acid-coated electrodes for medium-penetration welding, and Type 55 electrodes for standard welding. (K1, CN)

413-K. Study of a New Set-Up for Construction of Welded Street Car Rail Crossings and Branches. (In French.) G. Bélien. *Revue de la Soudure; Lastijdschrift*, v. 7, No. 1, 1951, p. 35-44.

Details of process. Results of experiments made to determine optimum operating conditions. (K general, T23, CN)

414-K. Application of Modern Theories of Tempering to a Particular Case of Flash Welding. (In French.) M. Dodero. *Soudure et Techniques Connexes*, v. 5, Jan.-Feb. 1951, p. 19-26.

Application of the principle of martempering to a welding machine, combining the effect of a flash and the passage of a current of convenient voltage between the poles of the machine. The heat emitted slows down the cooling and stops it at the temperature desired. The method was applied to a carbon steel saw. (K3, J26, CN)

415-K. Examples of Welded Construction of Machinery for Making Steel Plate. (In French.) G. Frehaut. *Soudure et Technique Connexes*, v. 5, Mar.-Apr. 1951, p. 67-74; disc., p. 74-76.

Various types of machines and advantages of welded construction. (K general, T5, CN)

416-K. A Modern Method for the Control of Spot-Welding Machines. (In French.) J. Negre. *Soudure et Technique Connexes*, v. 5, Mar.-Apr. 1951, p. 77-85; disc., p. 84-85.

Construction and functioning of electronic apparatus with emphasis on the "Chronotron". (K3)

417-K. Tight Sealing of Glass and Mica in a Vacuum. (In French.) J. Labeyrie and P. Léger. *Vide*, v. 6, Jan. 1951, p. 951-952.

Powdered enamel is used as the joining agent. This method can also be applied to joining mica to alloys having expansion coefficients of 85-110 x 10^{-7}. (K11)

418-K. Influence of Conditions of Spot-Welding of Low-Carbon Steel on Structure of the Weld Metal. (In Russian.) S. K. Sliozberg. *Avtogennoe Delo* (Welding), v. 22, Feb. 1951, p. 7-9.

Studied for steels containing 0.15-0.20% C. In low-carbon steel, structure of the spot and zones of thermal influence (depending on conditions of welding) affect, to a large extent, mechanical properties of the spot welds. Formation of such structures under different conditions of welding. (K3, CN)

419-K. Welded Rigid Frames Span 224 Ft. for Coliseum With Large Unobstructed Arena. Ralph E. Coblentz. *Engineering News-Record*, v. 147, July 12, 1951, p. 28-32.

Allen County War Memorial Coliseum, now under construction near Fort Wayne, Ind. (K general, T26, CN)

420-K. Today's Welding Equipment. J. W. St. Andre. *Factory Management and Maintenance*, v. 109, July 1951, p. 84-89.

An illustrated review. (K general)

421-K. Stitch It Instead. Part I. A. G. Denne. *Iron Age*, v. 168, July 19, 1951, p. 97-100.

Use of metal stitching to replace riveting and other joining methods in products ranging from autos to appliances, aircraft to toys. Production has been increased up to 700% at a cost of 9-12c per 100 stitches. Shear and tensile strength is good. Stitching is easily done by unskilled operators. Equipment power requirements are low. (K13)

422-K. Accurate Timing Essential for Low-Capacity Spotwelding. *Iron Age*, v. 168, July 19, 1951, p. 101.

Two examples of low-capacity spot-welding jobs at Westinghouse Electric Corp.'s Lamp Div., Bloomfield, N. J., which show that accurate weld time pays off on small jobs. (K3)

423-K. Tips on Welding High-Temperature Materials. F. H. Stevenson. *Iron Age*, v. 168, July 19, 1951, p. 109-111.

In production of military rockets, Aerojet Engineering has learned a lot about brazing and welding of Ti, stainless steels, and the special high-temperature super-alloys. All fusion and resistance welding techniques are used, selection depending upon practical considerations. (K general, SG-h, Ti, SS)

424-K. Convair "Metlbonds" B-36 Bomber. Charles L. Hibert. *Machinery* (American), v. 57, July 1951, p. 158-163.

Equipment and procedures for adhesive-bonding process developed by Consolidated Vultee Corp. It is applicable to a wide variety of sheet materials. (K12)

425-K. Electric Eye Accurately Locates Work in Riveting Operations. H. L. Hubbard. *Machinery* (American), v. 57, July 1951, p. 192-195. (K13)

426-K. Welding Copper Alloys. E. Ryalls. *Metal Industry*, v. 78, June 29, 1951, p. 519-523.

Review of the weldability of the many varieties of alloys available. Each metal has to be dealt with separately, the requirements expected from the joint determining such factors as flame setting, the rod, and the flux to be used. In order to ascertain the correct welding conditions, experimental welding runs should be made on scrap metal. (K9, K2, Cu)

427-K. The Bonding of Metals. C. J. Moss. *Metallurgia*, v. 43, June 1951, p. 267-272.

Bonding by use of synthetic-resin adhesives. Properties, nature of adhesion, preliminary cleaning, etc. Emphasis is on the "Redux" and "Araldite" types. (K12)

428-K. Doing the Job Better With Tracer-Controlled Welding. *Production Engineering & Management*, v. 28, July 1951, p. 95-96.

Automatic machine for contour-welding of steel, integrated with other operations, is providing greater production economies at American Radiator & Standard Sanitary's plant in Elyria, Ohio. (K general, ST)

429-K. A Survey of Modern Theory on Welding and Weldability. (Continued.) D. Séférian. *Sheet Metal Industries*, v. 28, July 1951, p. 643-652, 657.

Covers Cu and its alloys, brasses, bronzes, Ni, Inconel, cupronickels, Ni-silvers, Zn and its alloys, Mg alloys, and Pb. (To be continued.) (K9, Cu, Ni, Zn, Mg, Pb)

430-K. Sigma Welding Applications Expand. H. E. Rockefeller. *Steel*, v. 129, July 16, 1951, p. 75-78.

The shielded inert-gas metal-arc process using consumable electrodes is currently being applied commercially to Al, stainless, Cu, and Cu alloys and even to carbon steel. Small amounts of O_2 added to highly purified argon increase welding speed on steel. (K1, Al, SS, Cu)

431-K. Jobs You Can Do With Bronze Electrodes. F. E. Garriott. *Welding Engineer*, v. 36, July 1951, p. 20-24.

Many of the electrodes in the phosphor-bronze and Al bronze groups can be used interchangeably to weld Cu, Cu alloys, Ni-Cu alloys and Fe-base metals such as cast and malleable irons, high-carbon steels, low-alloy steels, toolsteels and Mn steels. Dissimilar metals and alloys are also joined with these electrodes. (K1, T5, Cu, Fe)

432-K. Welded Stainless for Dairies. Cvlde B. Clason. *Welding Engineer*, v. 36, July 1951, p. 25-28.

How equipment for the processing of milk and cream is welded from stainless by the inert-gas arc. (K1, SS)

Theoretical and practical aspects. Data on a variety of carbon, alloy, and stainless steels, are charted. Photomicrographs and 16 ref. (J23, CN, AY, SS)

189-J. Influence of Moderate Cold Working on the Kinetics of Hardening of Solid Solutions of Aluminum. (In French.) Aurel Berghezan. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 232, Apr. 23, 1951, p. 1560-1562.

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JOINING

377-K. Stainless Orange Peel Holds Nitrogen. *American Machinist,* v. 95, June 25, 1951, p. 129.

Welded sections of spherical tank for compressed-nitrogen storage are said to resemble peel of an orange. Stainless-steel plates are joined by heliarc welding. (K1, T26, SS)

378-K. Welding a 10-Story VA Hospital. R. A. Phelps. *Engineering News-Record,* v. 146, June 21, 1951, p. 32-35.

Cost data showing differences in various items between welded and riveted construction. Typical welded units. (K general, T26, CN)

379-K. Rotary Fixture Welds a Plowshare a Minute. *Iron Age,* v. 167, June 21, 1951, p. 98.

Use of an 8-place rotary fixture has increased production of welded plowshares by 10%. Plow consists of a die-cut gunnel and a forged share, which are welded together. The rotary fixture holds the parts of the plowshare in position and moves them under a Unionmelt welding head at 19.1 ipm. (K1, T3, CN)

380-K. The Magnesium Star. *Light Metals,* v. 14, June 1951, p. 293-298.

Fabrication procedures on four-pointed Mg star suspended over the main approach to the Festival of Britain. Main emphasis on adhesive joining of sandwich panels and on arc welding. (K1, K12, T9, Mg)

381-K. Defective Iron Castings Saved by Repair Welding. *Materials & Methods,* v. 33, June 1951, p. 86-88.

Procedures and applications. (K general, CI)

382-K. Welding Armored Vehicles. *Metal Progress,* v. 59, June 1951, p. 848, 850, 852. (Condensed from "Evolution of Welded Armored Fighting Vehicles", R. J. Fowler and L. F. Denaro.)

Previously abstracted from *Transactions of the Institute of Welding,* v. 9. See items 22-468 and 22-541, 1946. (K1, T2, CN)

383-K. Induction Soldering. *Sheet Metal Industries,* v. 28, June 1951, p. 566.

High-frequency heating used in soldering sink-type water heaters. (K7, Cu)

384-K. Continuous Welded Structures, Abbey Works, Port Talbot. W. S. Atkins. *Transactions of the Institute of Welding,* v. 14, Apr. 1951, p. 28-38; disc., p. 38-43.

Design and construction of a new steelworks in South Wales. (K1, T26, CN)

385-K. The Uses and Abuses of Arc-Welding Electrodes. I. C. Fitch. *Transactions of the Institute of Welding,* v. 14, Apr. 1951, p. 45-52; disc., p. 52.

Previously abstracted from *Sheet Metal Industries,* item 259-K, 1951. (K1, ST)

386-K. Heavy Fabrication at Chepstow. Rolt Hammond. *Welding & Metal Fabrication,* v. 19, May 1951, p. 160-166; June 1951, p. 210-212.

Weld fabrication of heavy equipment by a British firm. (K general, CN)

387-K. Production of Domestic Heating Equipment. *Welding & Metal Fabrication,* v. 19, June 1951, p. 198-201.

Welding and fabrication procedures. (K general, G general, CN)

388-K. Fabrication of Corrosion-Resistant Metals; The Importance of Metallurgical Control. J. F. Lancaster. *Welding & Metal Fabrication,* v. 19, June 1951, p. 202-209.

Major emphasis is on welding. (K general, SG-h)

389-K. Welding and Its Effect on the Corrosion Resistance of Stainless Steel. E. W. Hopper. *Welding Journal,* v. 30, June 1951, p. 503-507.

Welded stainless steel failures due to corrosion and methods of minimizing such failures. The use of water cooling is recommended. (K1, R1, SS)

390-K. Tungsten-Thoria Electrodes for Inert Arc Welding. N. A. Chapin, J. D. Cobine, and C. J. Gallagher. *Welding Journal,* v. 30, June 1951, p. 529-531.

Electrodes overcome the erratic transition of the arc from the high-frequency spark to the actual arc. Initiation of a tungsten arc under typical welding conditions in argon is shown in consecutive frames of a movie taken at 50 frames per sec. (K1, W, Th)

391-K. A Welded Factory Building In Italy. *Welding Journal,* v. 30, June 1951, p. 534-535.

Transverse and longitudinal sections of the building and details of the column and roof structure. (K26)

392-K. Braze-Welding Furnace and Boiler Sections. E. E. Cashen. *Welding Journal,* v. 30, June 1951, p. 544-545. (K8, CI)

393-K. Current Welding Research Problems. *Welding Journal,* v. 30, June 1951, p. 273s-282s.

Compilation made for university research workers listing current welding research problems and suggestions as to the needs of industry. (K9)

394-K. Explosion Bulge Test Studies of the Deformation of Weldments. Carl E. Hartbower and William S. Pellini. *Welding Journal,* v. 30, June 1951, p. 307s-318s.

Semiworks-scale testing of full welds in heavy plate under combined stress conditions such as prevail in structures and the significance of the findings in evaluation of weld performance. (K9, ST)

395-K. Flash Butt Welding of Steel. L. Sanderson. *British Steelmaker,* v. 17, Apr. 1951, p. 207-211; May 1951, p. 255-259; June 1951, p. 320-323.

Part I: How the process came to be adopted commercially and the component parts of a typical welding machine. Metallurgical aspects including hardness variations in different kinds of steel. Application of the process to manufacture of twist drills. Part II: Process, explaining the nature of the characteristic flashing action. Various uses of preheating as a preliminary to butt welding. The part played by mechanical pressure in the process. Part III: Importance of careful design, choice of suitable materials, correct alignment, and other factors. Advantages, and details of composition and care of the electrodes and jaws, and choice of equipment. Refers briefly to high-speed valve-controlled butt welding. (K3, ST)

396-K. Automatic Machines Weld 120 Steel Assemblies Hourly. Herbert Chase. *Industry & Welding,* v. 24, July 1951, p. 28, 30, 74.

Process used in production of Dynaflow transmissions by Buick Motor Div. Material is SAE 1008 hot rolled steel; submerged-arc welding is used. (K1, CN)

397-K. Quick Test Eliminates Defects in Brazing. *Industry & Welding,* v. 24, July 1951, p. 38, 66.

How impurities are detected in cupro-nickel alloys by heating coupons in a combustion-tube furnace. Good brazability is indicated by a bright surface. (K8, Cu)

398-K. Welded Design Features Stainless Steel Equipment for Armed Services. Arthur R. Hill. *Industry & Welding,* v. 24, July 1951, p. 40-41, 43-44, 73.

Shielded-arc welding of stainless steel dishwashers by Peters-Dalton, Inc., Detroit. (K1, SS)

399-K. Aluminum Tanks Welded in Unique Fixtures. T. E. Imholz. *Iron Age,* v. 168, July 5, 1951, p. 87-89.

Fixtures which facilitate arc welding of Al aircraft wingtip gas tanks at Republic Aviation. Both hand and automatic Heliarc welding methods are employed, with and without filler rods. (K1, Al)

400-K. Hints for Silver-Brazing of Stainless Steel. *Linde Tips and Oxy-Acetylene Tips,* v. 30, July 1951, p. 53-56.

(K8, SS)

401-K. Rail Joint Welding. A. E. Belton, V. D. Hanson, J. S. Gelston, and H. O. Zimmerman. *Mining Congress Journal,* v. 37, June 1951, p. 49-52.

A committee report describing several processes of rail welding for coal mine tracks, giving methods, costs, and service records. (K general, T23, CN)

402-K. High Strength Fastening. Gilbert C. Close. *Modern Machine Shop*, v. 24, July 1951, p. 102-106, 108, 110, 112, 114, 116-117.

Various methods of joining Al alloy structures to withstand stresses imposed by supersonic flight speeds. Confined entirely to use of rivets, lockbolts, and other mechanical fastening devices. (K13, Al)

403-K. A Timing Control for Small Spot Welders. M. H. Nichols. *Review of Scientific Instruments*, v. 22, June 1951, p. 372-373.

Circuit parameters and components. (K3)

404-K. Application of Electron-Diffraction to Bonding Problems. J. W. Malden. *Transactions of the Institution of the Rubber Industry*, v. 27, June 1951, p. 175-178.

Use of the electron-diffraction technique in eliminating a cause of failure in brass-to-rubber bonding. A tentative explanation of the mechanism of the bonding process is suggested. 12 ref. (K11, Cu)

405-K. 1950 Facts and Figures. *Welding Engineer*, v. 36, Mid-June 1951, p. 5-13, 16.

Statistical review of the welding industry. (K general, A4)

406-K. Die Welding by the Metal Arc. Arthur R. Butler. *Welding Engineer*, v. 36, June 1951, p. 28-30; July 1951, p. 32-35.

Recommended procedures. First installment: Factors influencing hardness. Concluding part: recommended procedures. (K1, TS)

407-K. Recent Advancement in Structural Welding. LaMotte Grover. *Western Machinery and Steel World*, v. 42, June 1951, p. 86-88, 94.

A review. (K general, T26, CN)

408-K. Copper Furnace Brazing's Place in Forming Aircraft Components. Howard Eubank and George F. Brown. *Western Metals*, v. 9, June 1951, p. 42-44.

Advantages of the process. Specimen components are illustrated. (K8)

409-K. Submerged Arc Unit Welds Pipe-Line on Right-of-Way. C. A. Renton. *World Oil*, v. 133, July 1, 1951, p. 211-212, 218.

New light, portable welding unit is mounted on a tractor and used to weld 26-in. pipe into 2, 3, and 4-joint sections. Tests proved the welds equal in quality to the longitudinal pipe welds made by the same process at the pipe mill. (K1, CN)

410-K. Welding Practice in Britain. C. G. Bainbridge. *Canadian Metals*, v. 14, June 1951, p. 34-36, 38, 46-47.

A progress report on the application of welding to ships, structural steel, and locomotive construction. (K general, T26, CN)

411-K. Influence of the Atmosphere and of Heat Treatment on the Electric Welding Process. (In French.) H. G. Geerlings. *Revue de la Soudure; Lastijdschrift*, v. 7, No. 1, 1951, p. 16-24.

Effect of method of production of steel and type of electrode (coated or uncoated) on amount of N_2 and O_2 absorbed by the weld; also influence of heat treatment immediately after welding. Optimum conditions of heat treatment. (K1, J general, ST)

412-K. Angle Welding in a Vertical Position. (In French.) M. Mouton. *Revue de la Soudure; Lastijdschrift*, v. 7, No. 1, 1951, p. 25-34.

A new economical method applicable to ST-52 structural steel, using FP heavily coated electrodes for deep-penetration welding, MP acid-coated electrodes for medium-penetration welding, and Type 55 electrodes for standard welding. (K1, CN)

413-K. Study of a New Set-Up for Construction of Welded Street Car Rail Crossings and Branches. (In French.) G. Bélien. *Revue de la Soudure; Lastijdschrift*, v. 7, No. 1, 1951, p. 35-44.

Details of process. Results of experiments made to determine optimum operating conditions. (K general, T23, CN)

414-K. Application of Modern Theories of Tempering to a Particular Case of Flash Welding. (In French.) M. Dodero. *Soudure et Techniques Connexes*, v. 5, Jan.-Feb. 1951, p. 19-26.

Application of the principle of martempering to a welding machine, combining the effect of a flash and the passage of a current of convenient voltage between the poles of the machine. The heat emitted slows down the cooling and stops it at the temperature desired. The method was applied to a carbon steel saw. (K3, J26, CN)

415-K. Examples of Welded Construction of Machinery for Making Steel Plate. (In French.) G. Frehaut. *Soudure et Technique Connexes*, v. 5, Mar.-Apr. 1951, p. 67-74; disc., p. 74-76.

Various types of machines and advantages of welded construction. (K general, T5, CN)

416-K. A Modern Method for the Control of Spot-Welding Machines. (In French.) J. Negre. *Soudure et Technique Connexes*, v. 5, Mar.-Apr. 1951, p. 77-85; disc., p. 84-85.

Construction and functioning of electronic apparatus with emphasis on the "Chronotron". (K3)

417-K. Tight Sealing of Glass and Mica in a Vacuum. (In French.) J. Labeyrie and P. Léger. *Vide*, v. 6, Jan. 1951, p. 951-952.

Powdered enamel is used as the joining agent. This method can also be applied to joining mica to alloys having expansion coefficients of 85-110 x 10^{-7}. (K11)

418-K. Influence of Conditions of Spot-Welding of Low-Carbon Steel on Structure of the Weld Metal. (In Russian.) S. K. Sliozberg. *Avtogennoe Delo* (Welding), v. 22, Feb. 1951, p. 7-9.

Studied for steels containing 0.15-0.20% C. In low-carbon steel, structure of the spot and zones of thermal influence (depending on conditions of welding) affect, to a large extent, mechanical properties of the spot welds. Formation of such structures under different conditions of welding. (K3, CN)

419-K. Welded Rigid Frames Span 224 Ft. for Coliseum With Large Unobstructed Arena. Ralph E. Coblentz. *Engineering News-Record*, v. 147, July 12, 1951, p. 28-32.

Allen County War Memorial Coliseum, now under construction near Fort Wayne, Ind. (K general, T26, CN)

420-K. Today's Welding Equipment. J. W. St. Andre. *Factory Management and Maintenance*, v. 109, July 1951, p. 84-89.

An illustrated review. (K general)

421-K. Stitch It Instead. Part I. A. G. Denne. *Iron Age*, v. 168, July 19, 1951, p. 97-100.

Use of metal stitching to replace riveting and other joining methods in products ranging from autos to appliances, aircraft to toys. Production has been increased up to 700% at a cost of 9-12c per 100 stitches. Shear and tensile strength is good. Stitching is easily done by unskilled operators. Equipment power requirements are low. (K13)

422-K. Accurate Timing Essential for Low-Capacity Spotwelding. *Iron Age*, v. 168, July 19, 1951, p. 101.

Two examples of low-capacity spot-welding jobs at Westinghouse Electric Corp.'s Lamp Div., Bloomfield, N. J., which show that accurate weld time pays off on small jobs. (K3)

423-K. Tips on Welding High-Temperature Materials. F. H. Stevenson. *Iron Age*, v. 168, July 19, 1951, p. 109-111.

In production of military rockets, Aerojet Engineering has learned a lot about brazing and welding of Ti, stainless steels, and the special high-temperature super-alloys. All fusion and resistance welding techniques are used, selection depending upon practical considerations. (K general, SG-h, Ti, SS)

424-K. Convair "Metibonds" B-36 Bomber. Charles L. Hibert. *Machinery* (American), v. 57, July 1951, p. 158-163.

Equipment and procedures for adhesive-bonding process developed by Consolidated Vultee Corp. It is applicable to a wide variety of sheet materials. (K12)

425-K. Electric Eye Accurately Locates Work in Riveting Operations. H. L. Hubbard. *Machinery* (American), v. 57, July 1951, p. 192-195. (K13)

426-K. Welding Copper Alloys. E. Ryalls. *Metal Industry*, v. 78, June 29, 1951, p. 519-523.

Review of the weldability of the many varieties of alloys available. Each metal has to be dealt with separately, the requirements expected from the joint determining such factors as flame setting, the rod, and the flux to be used. In order to ascertain the correct welding conditions, experimental welding runs should be made on scrap metal. (K9, K2, Cu)

427-K. The Bonding of Metals. C. J. Moss. *Metallurgia*, v. 43, June 1951, p. 267-272.

Bonding by use of synthetic-resin adhesives. Properties, nature of adhesion, preliminary cleaning, etc. Emphasis is on the "Redux" and "Araldite" types. (K12)

428-K. Doing the Job Better With Tracer-Controlled Welding. *Production Engineering & Management*, v. 28, July 1951, p. 95-96.

Automatic machine for contour-welding of steel, integrated with other operations, is providing greater production economies at American Radiator & Standard Sanitary's plant in Elyria, Ohio. (K general, ST)

429-K. A Survey of Modern Theory on Welding and Weldability. (Continued.) D. Séférian. *Sheet Metal Industries*, v. 28, July 1951, p. 643-652, 657.

Covers Cu and its alloys, brasses, bronzes, Ni, Inconel, cupronickels, Ni-silvers, Zn and its alloys, Mg alloys, and Pb. (To be continued.) (K9, Cu, Ni, Zn, Mg, Pb)

430-K. Sigma Welding Applications Expand. H. E. Rockefeller. *Steel*, v. 129, July 16, 1951, p. 75-78.

The shielded inert-gas metal-arc process using consumable electrodes is currently being applied commercially to Al, stainless, Cu, and Cu alloys and even to carbon steel. Small amounts of O_2 added to highly purified argon increase welding speed on steel. (K1, Al, SS, Cu)

431-K. Jobs You Can Do With Bronze Electrodes. F. E. Garriott. *Welding Engineer*, v. 36, July 1951, p. 20-24.

Many of the electrodes in the phosphor-bronze and Al bronze groups can be used interchangeably to weld Cu, Cu alloys, Ni-Cu alloys and Fe-base metals such as cast and malleable irons, high-carbon steels, low-alloy steels, toolsteels and Mn steels. Dissimilar metals and alloys are also joined with these electrodes. (K1, T5, Cu, Fe)

432-K. Welded Stainless for Dairies. Cvde B. Clason. *Welding Engineer*, v. 36, July 1951, p. 25-28.

How equipment for the processing of milk and cream is welded from stainless by the inert-gas arc. (K1, SS)

433-K. Tanks of Welded Aluminum. Perry C. Arnold. *Welding Engineer*, v. 36, July 1951, p. 29-31.

Use of inert-gas arc welding for production of Al storage and pressure vessels. (K1, Al)

434-K. Practical Hints From a Consulting Engineer. (In German.) H. Schulz. *Schweissen und Schneiden*, v. 3, June 1951, p. 164-172.

A wide variety of welding problems applicable to both ferrous and nonferrous metals. (K general)

435-K. Reducing the Production Costs of Welded Railroad Cars. (In German.) M. Reiter. *Schweissen und Schneiden*, v. 3 June 1951, p. 178-182.

Factors which affect the costs of production. Practical suggestions supplemented by drawings and tabulated data. (K general, T23, CN)

436-K. Advances in the Field of Welding and Cutting; New Literature on Calculation of Welds. (In German.) H. Kunz. *Schweissen und Schneiden*, v. 3, June 1951, p. 190-191.

A review. 37 ref. (K general, G22)

437-K. Copper and Copper Alloys as Addition Materials in Welding and Soldering. (Concluded.) (In German.) Benno Sixt. *Schweisstechnik*, v. 5, Apr. 1951, p. 37-40.

Various factors that effect solderability of steel. Shows how Cu-alloy electrodes can be used for repair of Cu, brass, bronze, and cast iron. (K7, K1, Cu, CI)

438-K. (Book) **Mechanical Fastening Methods for Aluminum.** F. F. Dietsch. 136 pages. Reynolds Metals Co., 2500 S. 3rd St., Louisville, 1, Ky.

The many different ways for mechanically joining Al parts, including use of metal stitching, resin bonding, and mechanically formed joints. Other joints are made with rivets, screw fasteners, nails, or pins. Applications and advantages of each. (K13, Al)

439-K. (Book) **New Lessons in Arc Welding.** 320 pages. Lincoln Electric Co., Cleveland 17. $1.00 in the U. S.; $1.50 elsewhere.

Based on lessons and instruction given at the Lincoln Arc Welding School. Lessons are practical, not theoretical, and cover basic fundamentals of arc welding as well as more advanced welding of alloys, sheet metal, and pipe. The basic lessons cover welding mild steel in all positions and advanced lessons cover other welding applications. Practice material, exercises, questions and answers are given for each lesson. (K1)

L

CLEANING, COATING AND FINISHING

478-L. The Nature and Use of Petroleum Base Rust Preventives. Howard B. Carpenter. *American Society of Lubrication Engineers*, 1951, 15 pages.

Properties and applications. Covers plastic types (grease-like), fluid types, thin film types, and solvent types. (L26)

479-L. A New Processing Scalebreaker. J. I. Greenberger. *Iron and Steel Engineer*, v. 28, June 1951, p. 95-101; disc., p. 101.

New type of scalebreaker used to facilitate scale remover by passage through rolls prior to pickling. Results of test runs show improvements over old methods for both plain carbon and stainless steels. Details of calculation of power requirements. Pickling time and acid requirements are reduced substantially. (L10, L12, ST)

480-L. Thin, Attractive Metal Coatings Produced by Vacuum Method. Kenneth Rose. *Materials & Methods*, v. 33, June 1951, p. 71-73.

Procedures and applications. Al is the most widely used metal for vapor metallizing nonmetallic materials such as plastics, glass, fabrics, and paper. (L25, Al)

481-L. Preparation of Very Fine Wire by Electropolishing. William H. Colner, Morris Feinleib, and Howard T. Francis. *Metal Progress*, v. 59, June 1951, p. 795-797.

Development of a process by which stainless steel wire, and wire of other metals and alloys, may be reduced in diameter far below the limit possible by conventional wiredrawing practices, by a readily controllable process of continuous electropolishing. Product's eventual fineness is determined chiefly by wire speed and polishing current, once composition, temperature, and agitation of bath are under control. (L13)

482-L. Ceramic Coatings for Molybdenum. *Metal Progress*, v. 59, June 1951, p. 872, 874. (Condensed from "A Study of Ceramic Coatings for High-Temperature Protection of Molybdenum", D. G. Moore, L. H. Bolz, and W. N. Harrison.)

Previously abstracted from *National Advisory Committee for Aeronautics*, Technical Note 1626, July 1948. See item 7c-30, 1948. (L27, Mo)

483-L. Studies of High-Temperature Protection of a Titanium-Carbide Ceramal by Chromium-Type Ceramic-Metal Coatings. Dwight G. Moore, Stanley G. Benner, and William N. Harrison. *National Advisory Committee for Aeronautics*, Technical Note 2386, June 1951, 26 pages.

A coating consisting of 80 parts Cr powder, 20 parts frit (glass), and 5 parts kaolin, when applied to a ceramal of 80% TiC and 20% Co and fired with H_2, will inhibit oxidation of the ceramal for extended periods at 1800° F. Durability of the coating as affected by frit content, firing temperature, firing time, and number of coats. Relative effectiveness of the coatings at jet-engine temperatures. Four coatings of varying frit content were applied and the specimens were studied with respect to oxidation penetration, transverse breaking load, and thermal shock resistance after prolonged heating in air at 1650, 1800, 2000, and 2200° F. (L27, Cr, C-n)

484-L. Some Characteristics of Composite Tungsten Carbide Weld Deposits. Howard S. Avery. *Welding Journal*, v. 30, June 1951, p. 532-534.

Author of the above article, which appeared in the Feb. 1951 issue (item 118-L) replies to comments and discussion published in the same issue. (L24, Q9, C-n, W)

485-L. Ceramic Coatings Prevent Exhaust-Gas Corrosion. *Technical News Bulletin* (National Bureau of Standards), v. 35, June 1951, p. 89-91.

Development of above by Dwight G. Moore and Mary A. Mason. (L27, R9, Ni, SS, Co, SG-h)

486-L. Nodule Method Measures Adhesion of Electrodeposits. *Technical News Bulletin* (National Bureau of Standards), v. 35, June 1951, p. 80-82. (Condensed from paper by Abner Brenner and Virginia Dare Morgan.)

Previously abstracted from *Proceedings of the American Electroplaters' Society*. See item 120-L. (L17)

487-L. The Finishing of Stainless Steels. J. Lomas. *Machinery Lloyd* (Overseas Edition), v. 23, May 26, 1951, p. 85-88.

Ways in which a high degree of surface finish can be obtained. Pickling of stainless steels and differences between this operation on stainless and normal steels. Polishing and buffing operations. A table shows the recognized scale of finishes on stainless steel. Notes on the finishing of welds in stainless steel. (L general, SS)

488-L. A Review of Factors Influencing the Life of Galvanizing Pots. D. N. Fagg. *Sheet Metal Industries*, v. 28, June 1951, p. 574-575.

Temperature of Zn, composition of the steel used to make the pot, defects in the pot arising during fabrication, and composition of the Zn. (L16, R6, Zn, ST)

489-L. Electric Furnaces for Vitreous Enamelling. *Sheet Metal Industries*, v. 28, June 1951, p. 576-578.

Equipment used. (L27)

490-L. The Chromising Process. T. Gibson. *Sheet Metal Industries*, v. 28, June 1951, p. 569-571, 575.

Abstracted under similar title from *Metal Treatment and Drop Forging*. See item 457-L, 1951. (L15, ST, Cr)

491-L. Causes of the Retarding Effect of Aluminum in Galvanizing Baths. (In German.) H. Bablik, F. Götze, and R. Kukaczka. *Werkstoffe und Korrosion*, v. 2, May 1951, p. 163-165.

The time-limited and temperature-dependent retardation of the reaction of fusible Zn with solid Fe caused by small Al additions is explained by formation of an Fe-Al film which blocks diffusion of Zn and Fe. (L16, Zn)

492-L. Prevention of Corrosion by Metal Spraying. (In German.) H. Biel. *Werkstoffe und Korrosion*, v. 2, May 1951, p. 182-185.

A coefficient derived from the heat content of each metal is used to determine rate of supply in wire-spraying apparatus and particle size of the metal in powder-spraying apparatus. Efficiency of powder-spraying apparatus is said to be higher than that of wire-spraying apparatus. The first are used for nonmetallic materials, hard metals, and partly for Zn. Corrosion tests showed a decrease of resistance in the following order: wire-sprayed, powder-sprayed, coatings prepared electrolytically or by dipping into molten Zn. (L23)

493-L. Testing of Efficacy of Various Methods of Cleaning Mineral-Oil Layers From Steel Surfaces. (In Polish.) M. Smialowski, J. Foryst, and I. Madejski. *Prace Glownego Instytutu Metalurgii*, v. 3, no. 1, 1951, p. 55-63.

Sheet steel specimens were coated with mineral oil, by immersion in machine-oil solutions of benzene, and then subjected to the action of various emulsifying baths. Degree of oil removed was determined by observations of fluorescence effect using ultraviolet rays. It was found that oil layers deposited in above way can be more easily removed than layers left after cold rolling of sheets. The electrolytic cleaning method is superior to immersion in emulsifying baths, but application of organic solvents is most satisfactory. (L12, ST)

494-L. Surface Treatments for Cutting Tools. *American Machinist*, v. 95, July 9, 1951, p. 183.

Data sheet gives several treatments used in the automotive industry to increase the life of cutting tools. They are as follows: fine-finish grinding; nitriding, single treatment; nitriding, double-treatment; hard Cr plating; and steam oxidizing. (L17, G18, J28, TS)

495-L. New Chemical Bath "Blasts" Scale From Forgings. *Automotive Industries*, v. 105, July 1, 1951, p. 57.

Scale-removal process using a new proprietary chemical—Pennsalt SR-4—developed by Pennsylvania Salt Mfg. Co. (L12, ST)

496-L. Fabrication and Finishing at Perfection Stove. Walter Rudolph. *Finish*, v. 8, July 1951, p. 21-24.

Equipment and procedures. Press operations and finishing. (L general, G1, CN)

497-L. Flow Coating Cabinets and Components for Dishwashers. Arnold Carlsen. *Finish*, v. 8, July 1951, p. 27-28, 62.

How Hotpoint covers 28,000 sq. ft. of metal surface area in 16 hr. with 12 gal. of prime coat at the Milwaukee dishwasher plant. (L26, CN)

498-L. Five-Minute Bath Descales Forgings. *Iron Age*, v. 168, July 5, 1951, p. 86.

See abstract of "New Chemical Bath 'Blasts' Scale From Forgings." *Automotive Industries*, item 495-L. (L12, ST)

499-L. Armed Forces Adopt New Waterproof Packaging. *Iron Age*, v. 168, July 12, 1951, p. 96-97.

New packing material just approved by the Armed Forces and sold under the trade name "Metalam." It is composed of layers of cotton scrim, polyethelene, Al foil, and an outer vinyl film. It is being used to protect all types of war material, from finished products to replacement parts. (L26, Al)

500-L. Plating in the Re-Armament Program. Seymour Senderoff. *Metal Finishing*, v. 49, July 1951, p. 86-88, 114.

A general discussion. (L17)

501-L. Finishing Army Ordnance Materiel. G. T. Viglione. *Metal Finishing*, v. 49, July 1951, p. 89-91, 114-115.

Measures being taken to prevent corrosion difficulties encountered on ordnance material and a survey of the finishes available to ordnance engineers to alleviate operational difficulties due to corrosion. (L general, T2)

502-L. Plating's Role in Naval Ordnance; The Naval Gun Factory at Anacostia. *Metal Finishing*, v. 49, July 1951, p. 92-95, 115-116.

Facilities of the gun factory. (L17, T2)

503-L. Electroforming of Precision Military Components. S. G. Bart. *Metal Finishing*, v. 49, July 1951, p. 96-97, 116-117.

Process is defined as "the creation of metallic articles by electrodeposition." Mechanical aspects of the process. Typical modern applications. (L18)

504-L. Military Applications of Electroforming. M. H. Orbaugh. *Metal Finishing*, v. 49, July 1951, p. 98-99, 118-120.

Illustrated survey includes description of the process. (L18, T2)

505-L. Hard Chrome Plating—the Industrial Workhorse. J. A. Williams. *Metal Finishing*, v. 49, July 1951, p. 100-102, 120.

Illustrated survey of above process, properties of the plate, and applications. (L17, Cr)

506-L. Heavy Silver Plating of Bearings. Frank C. Mesle. *Metal Finishing*, v. 49, July 1951, p. 103-104, 121-122.

Process by which coatings 0.020-0.060 in. thick are applied to steel for aircraft engine bearings. Comparative lives of these and other types of bearings are shown graphically. (L17, Ag, ST, SG-c)

507-L. Phosphate Coatings in Defense Production. Alfred Douty. *Metal Finishing*, v. 49, July 1951, p. 105-108, 120-121.

Procedures and applications. The latter include: paint-bonding to Fe, Zn, Cd, Al, and their common alloys; "rustproofing" of Fe, steel, and Al, with or without the aid of corrosion-preventive oils, etc.; protecting friction surfaces of ferrous metal; and improving cold drawing, cold extrusion, and cold forming of steel. (L14, F general, Fe, Zn, Cd, Al)

508-L. Chromate Finishes in War and Peace. H. C. Irvin. *Metal Finishing*, v. 49, July 1951, p. 109-113.

Nature and properties of chromate films, their applications to various metals, their corrosion resistance and appearance, their use as paint bases, their mechanisms of action, formulation of chromate baths, and bath variations required by processing limitations. They are applied to Zn, Cd, Al, Cu, brass, and bronze. (L14, Zn, Cd, Al, Cu)

509-L. Production Prime Coating of Automotive Parts. Fred M. Burt. *Organic Finishing*, v. 12, June 1951, p. 8-10, 15.

The prime-coating installation at the Nash automobile assembly plant, Calif. The conveyor, cleaning and phosphating, solution heating methods, dry-off oven, dip installation, and baking. (L26)

510-L. Factors Affecting the Testing of Automotive Finishes. Ralph J. Wirshing and Wardley D. McMaster. *Paint, Oil, & Chemical Review*, v. 114, July 5, 1951, p. 12-14, 16-18.

Typical experimental results on alkaline cleaning methods, enameled Cr surfaces, and primers and surfacers. Data are charted and tabulated; exposure-test panels are illustrated. (L12, L14, L26, CN, Cr)

511-L. Cleaning and Preparation of Metals for Electroplating. III. Degreasing Evaluation Tests: The Atomizer Test. Henry B. Linford and Edw. B. Saubestre. *Plating*, v. 38, July 1951, p. 713-717.

New method for determining the presence of greasy materials on metal surfaces. The test involves the following steps: evaporation of all surface moisture; spraying of water against the panel using an atomizer; and measuring of areas covered by a thin, uniform film of water. Details of the equipment and procedure. Results obtained with oiled panels cleaned to various degrees in alkaline solutions. (L12)

512-L. Metal Surfacing for Original Parts. *Product Engineering*, v. 22, July 1951, p. 122-124.

Various processes and metals and alloys used for the above. The main processes are welding, metallizing, and vacuum deposition. Mechanical properties of various surfacing materials are shown graphically. (L22, L23, L24, L25, Q general, SG-m)

513-L. Refractory Facing on Mild Steel. *Engineering*, v. 171, June 22, 1951, p. 763. (From Report 50/4/73, Industrial Gas Development Committees, Gas Council, London.)

Process for protection of mild steel against the effects of high temperature, in which the steel is given a refractory coating. The process consists in carrying, in a borosilicate matrix, a suspension of insoluble refractory material and bonding it to the metal surface by fusion at about 800° C. Properties of the coating depend on proportion of refractory matrix, particle size, number of layers present, and porosity of the upper face. (L27, CN)

514-L. The Problem of Painting Bright Chromium Plate. Wardley D. McMaster. *Plating*, v. 38, July 1951, p. 696-698, 703.

Difficulty was experienced in obtaining satisfactory adhesion of enamel to Cr plate in the automotive industry. Effects of various factors were studied experimentally, including pretreatments, base metal (no effect), acid concentration used for pretreatment, drying technique, and enamel formulation. (L26, Cr)

515-L. From Laboratory to Production Line. *Die Castings*, v. 9, July 1951, p. 42-43, 58-59.

Chemical cleaning and electrostatic spray finishing of pressed-steel and die-cast Al and Zn parts for business machines. (L12, L26, ST, Al, Zn)

516-L. Organic Coatings for Substitute Finishes and Protective Films. *Die Castings*, v. 9, July 1951, p. 44, 61.

Possibilities of substitutions forced by government restrictions on plating metals. (L26)

517-L. Automatic Barrel Plating; New Canning Plant at the British Screw Co., Ltd. *Iron and Steel*, v. 24, June 1951, p. 217-220.

Includes layout diagram and illustrations of Zn plating for screws, bolts, and nuts. (L17)

518-L. Continuous Electrogalvanizing. *Metal Industry*, v. 78, June 15, 1951, p. 484-489.

Said to be the largest continuous electrogalvanizing plant in the world. It is operated by Maclean & Co., Ltd., in England. (L16, Zn, CN)

519-L. Procedure for Repairing Articles of Steel, Cast Iron, Copper and Its Alloys, Aluminum, and Light Alloys by Powdered-Metal Spraying Using an Oxy-Acetylene Torch. (In French.) M. Cauchetier. *Fonderie*, Mar. 1951, p. 2385-2391.

A method for making the above repairs by passing the metal through the torch and, with the aid of compressed gas, forcibly bringing the metal into contact with the article to be repaired at the precise moment when it melts. (L23)

520-L. Study of Electrolytic Deposits in Very Dilute Solution. I and II. (In French.) André Coche. *Journal de Chimie Physique et de Physico-Chimie Biologique*, v. 48, Mar.-Apr. 1951, p. 135-149.

Part I: Use of radioactive isotopes as indicators. Influence of electrode and concentration on the critical potential. Shows that the latter is directly dependent on the nature and surface of the electrode; and that, even for Au, dilute solutions show anomalies, and that Pb-Pt systems differ greatly in behavior from others. Critical potentials and deposits of Po on Mo, W, and Ta; of Bi on Au, Pt, and Ta; of Pb on various metals; of Bi on Au; and of Pb on Pt were studied. Part II describes and diagrams a potentiostat for study of potentials. (L17)

521-L. Prevention of Slagging and Corrosion by Means of Protective Coatings on the Fire Side of Boiler Heating Surfaces. (In German.) H. Böhme. *Brennstoffe-Wärme-Kraft*, v. 3, June 1951, p. 189-192.

Effects of treatment of the boiler-tube surfaces with lime and with graphite, and of coating them with different metals. Photographs and tabular data show that only the graphite-oil treatment gives satisfactory results. (L26, ST)

522-L. Cathodic Polarization During Electrodeposition of Nickel. (In Russian.) A. T. Vagramyan and E. A. Solov'eva. *Doklady Akademii SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 77, Apr. 1, 1951, p. 629-631.

Relation between overvoltage and current density within wide limits of the latter. A new method for rapid determination of the shape of the polarization curve is proposed. Theoretical basis of this method, its technique, and optimum conditions of operation. (L17, Ni)

523-L. A Discussion of Structural Steel Painting. D. S. Threlkeld. *American Paint Journal*, v. 35, July 16, 1951, p. 68, 70-72.

Proposes the maintenance of adequate data records to follow field application and performance. (L26, CN)

524-L. The Cobalt-Reduction Theory for the Adherence of Sheet-Iron Ground Coats. J. H. Healy and A. I.

Andrews. *Journal of the American Ceramic Society*, v. 34, July 1, 1951, p. 207-214; disc., p. 219-220.

New data on the adherence phenomenon of Co ground-coat enamels. The H_2-reduction theory. Shows that Co oxide of the enamel is reduced to Co metal which forms a bond with the Fe and the enamel. 57 ref. (L27, CN)

525-L. The Elements of the Third, Fourth, and Fifth Series as Possible Adherence-Promoting Materials for Sheet-Iron Enamels. J. H. Healy and A. I. Andrews. *Journal of the American Ceramic Society*, v. 34, July 1, 1951, p. 214-219; disc., p. 219-220.

These elements were divided into five groups on the basis of such properties as heats of formation, melting points, vapor pressures, atomic radii, unit-cell dimensions, and H_2 solubilities. 13 ref. (L27, P12, P10)

526-L. Electroforming Speeds the Production of Aircraft Parts and Tools. G. B. Lewis and L. Frost. *Machinery* (American), v. 57, July 1951, p. 178-185.

Kinds of metals deposited, types of molds and matrices used, and general procedure followed in making airplane parts and molds by electroforming. (L18)

527-L. The Evaluation of Vinyl Coatings for Surfaces Subject to Fresh Water Immersion. J. L. Rohwedder and F. W. Shanks. *Paint and Varnish Production*, v. 41, July 1951, p. 19-22, 34.

Method used by Rock Island District, Corps of Engineers, for evaluation of coatings for structural steel components. (L26, CN)

528-L. Metallizing—To Prolong Life of Refinery Equipment. Joe E. Young, Jr. *Petroleum Refiner*, v. 30, July 1951, p. 118-120.

The process and its refinery applications. (L23, T29)

529-L. Blitz Cans Receive Corrosion Resisting Specification Finish in Production Finishing Setup. Ezra A. Blount. *Products Finishing*, v. 15, July 1951, p. 38-48, 50, 52.

Equipment and procedures for production of 5-gal. flat gasoline containers for the Armed Forces, by Conco Engineering Works, Mendota, Ill. Includes shearing, stamping, forming, parts cleaning and assembly, phosphating, electrostatic spray painting, and infrared baking. (L general, G general, CN)

530-L. Solution Heating Methods Improve Plating Plant Operating Efficiency. Arthur Q. Smith. *Products Finishing*, v. 15, July 1951, p. 58-62.

Equipment and procedures of Electro-Platers Co., Milwaukee, a job-plating shop. (L17)

531-L. Outlook for Continuous Galvanizing Lines in U. S. A. E. A. Matteson. *Products Finishing*, v. 15, July 1951, p. 64.

Excerpts from an address. (L16, CN, Zn)

532-L. Symposium on Design: Components for Vitreous Enamelling. *Sheet Metal Industries*, v. 28, July 1951, p. 661-669.

Lengthy summaries of the following papers presented at recent British meeting: "The Styling of Enameled Products." A. B. Kribride: "The Production of Castings for Subsequent Vitreous Enamelling," Wm. Todd; "Design and Production of Sheet-Metal," C. S. Beers: and "An Enameller's Viewpoint of Design," T. J. MacArthur. (L27)

533-L. Suspending Devices for Plating Baths. (In German.) O. Kramer. *Metalloberfläche*, ser. B, v. 3, June 1951, p. B81-B83.

Various types of these devices. (L17)

534-L. Anodes for Chromium Plating. (In German.) Edm. R. Thews. *Metalloberfläche*, ser. B, v. 3, June 1951, p. B84-B86.

Various published and patented suggestions on improvement of anodes and, especially, on the use of soluble anodes. (L17, Cr)

535-L. Investigation of Deposition Welding of Rails. (In German.) K. Wellinger and H. Gaisser. *Schweissen und Schneiden*, v. 3, June 1951, p. 173-178.

Results of hardness tests, wear-resistance tests, and microstructures of deposits of seven different coated and uncoated electrodes on street-car rails. (L24, T23, CN)

536-L. Influnce of Additions on Electrodeposition of Metals. (In Russian.) V. V. Mikhailov. *Uspekhi Khimii* (Progress in Chemistry), v. 20, Mar.-Apr. 1951, p. 194-212.

The action of foreign cations, anions, and non-electrolytes are investigated; and existing theories of effect of additions critically discussed. 76 ref. (L17)

M

METALLOGRAPHY, CONSTITUTION AND PRIMARY STRUCTURES

176-M. Report of Committee E-4 on Metallography. L. L. Wyman, chairman. *American Society for Testing Materials*, Preprint 86, 1951, 3 pages.

Miscellaneous recommendations. (M21)

177-M. Microstructure of Titanium. H. P. Roth. *Metal Progress*, v. 59, June 1951, p. 816B.

Metal was made from powder and sponge, and arc melted. Microstructures as extruded and annealed at 900° C. (M27, Ti)

178-M. Carbide Phase in Tempered Steel. *Metal Progress*, v. 59, June 1951, p. 878, 880.

Previously abstracted from "The Crystal Structure and Particle Size of the Carbide Phase in Tempered Steel", M. P. Arbuzov, *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR). See item 282-M, 1950. (M26, N8, CN)

179-M. Thorium-Carbon System. Premo Chiotti. *Atomic Energy Commission*, AECD-3072, June 5, 1950, 61 pages.

A tentative phase diagram was constructed from metallographic, X-ray, and melting-point data. The existence of two compounds, ThC and ThC_2, was verified. A method was devised for measuring electrical resistance at very high temperatures using automatic recording and control instruments. Also a furnace suitable for resistance heating of test bars under vacuum on an inert atmosphere. Evidence indicates existence of an allotropic modification of Th at temperatures above 1400° C. 27 ref. (M24, P15, Th, C-n)

180-M. Crystal Chemistry of the Metal Carbides and Their Importance in Metallurgy. (In German.) W. Epprecht. *Chimia*, v. 5, Mar. 15, 1951, p. 49-60.

Lattice structure, formation, and composition of carbides and their effects on the properties of alloys. 35 ref. (M26, C-n)

181-M. Q-Phase of the System Al-Cu-Mg. (In Russian.) M. S. Mirgalovskaya. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 77, Mar. 11, 1951, p. 289-292.

Investigation of the central region of the constitutional diagram of the Al-Cu-Mg system revealed the presence of a new 5th ternary intermetallic phase, designated the Q-phase. This phase is very similar to the U and T phases of the same system. Location of the new phase and boundary of its solid solutions were established on the basis of microstructural analysis. (M24, Al, Cu, Mg)

182-M. Observations on Cleavage and Polygonization of Molybdenum Single Crystals. Neng-Kuan Chen and Robert Maddin. *Journal of Metals*, v. 3, July 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 531-532.

Observations made by means of Laue back-reflection technique. (M26, N5, Mo)

183-M. The Crystal Structure of V_3Co. Pol Duwez. *Journal of Metals*, v. 3, July 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 564.

In the course of an investigation of the V-Co system, two intermediate phases were found. One of these phases corresponds approximately to the stoichiometric composition VCo and is isomorphous with the sigma phase in the Fe-Cr system. The second phase has the composition V_3Co; its crystal structure is described in the present note. (M26, V, Co)

184-M. Metallography of Electro-Tinplate. J. E. Davies and W. E. Hoare. *Journal of the Iron and Steel Institute*, v. 168, June 1951, p. 134-140.

Samples of electro-tinplate from seven different sources were examined by two metallographic techniques—oblique cross-sectioning and surface examination after detinning. Suitable methods of preparation of micro-specimens were developed. A layer identified as $FeSn_2$ was observed in all flow-brightened samples. Reasons for crystallographic appearance of this compound. 19 ref. (M21, L17, Sn, CN)

185-M. Application of Electron Diffraction to the Study of Reactions Between Two Surfaces in Contact. (In French.) Lucienne Lecuir, Henry Bildé, and Jean Devaux. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 232, Apr. 23, 1951, p. 1556-1558.

Proposes use of electron diffraction by reflection, because direct electron diffraction is not applicable to mixtures of powdered substances. Applicability of this method is demonstrated by study of a fused mixture of Al_2O_3 and NiO powders, also by study of a glass-metal seal (Mo on glass). Results show that electron diffraction makes possible study of reactions between solids. (M22)

186-M. Preparation of Ag-Mg Alloys in Thin Layers by the Simultaneous Evaporation of the Constituents in a Vacuum. (In French.) Stanislas Goldsztaub and Pierre Michel. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 232, May 16, 1951, p. 1843-1845.

A method of preparing Ag-Mg alloys of different composition. (M21, Ag, Mg)

187-M. Point Method of Crystallographic Analysis. (In French.) Raymond Castaing and André Guinier. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 232, May 21, 1951, p. 1948-1950.

Micro-analysis by diffraction gives not only the chemical composition of the microscopic inclusion, but also allows its crystalline network to be identified and the orientation and parameters of the latter to be determined. (M22, M26)

188-M. The Possibilities of Radiocrystallography as a Method of Non-Destructive Control. (In French.) A. Guinier. *Métaux: Corrosion—Industries*, v. 26, Mar. 1951, p. 131-134.

Procedure. Diagram shows a

punched card designed for indexing the crystallographic properties of materials. (M23)

189-M. Study of Sub-Surface Layers by X-Rays. (In French.) C. Legrand. *Métaux: Corrosion—Industries*, v. 26, Apr. 1951, p. 166-169.

A Debye-Scherrer Chamber, which is quite precise, and allows the subsurface layers to be studied by diffracted rays at small angles. (M22)

190-M. The Determination of Inclusions. (In French.) M. Lacomble and J. Varetto. *Revue de Métallurgie*, v. 48, Mar. 1951, p. 199-204.

Anodic dissolution involves two processes: extraction of the inclusions and their analytical separation and determination. Reviews known facts and describes new experiments. (M23, ST)

191-M. The Problem of the Electrolytic Isolation of Carbides. (In German.) Paul Koch. *Archiv für das Eisenhüttenwesen*, v. 22, May-June 1951, p. 155-157.

Klinger and Koch's method as applied to Mo steel, using alternating current. The most favorable electrical conditions were determined. (M23, AY, C-n)

192-M. Structure of Ni-Al Alloys in β-Phase at High Temperatures. (In Russian.) L. N. Guseva and E. S. Makarov. *Doklady Akademii SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 77, Apr. 1, 1951, p. 615-616.

Experimental investigation indicated that, with increasing temperature, the region of the solubility of Ni in Al increases. In the region of Ni concentration between 60 and 66 at. %, alloys heated up to 1340° C. are uniphase and possess a tetragonal structure. X-ray analysis of such alloys in the annealed state showed the presence of two phases $\beta + \alpha'(Ni_3Al)$, which is in agreement with the constitution diagram. Crystallographic constants of the uniphase are presented. (M24, Ni, Al)

193-M. On the Etched Surfaces of Nickel Single Crystals. Shigeto Yamaguchi. *Journal of Applied Physics*, v. 22, July 1951, p. 983-984.

Results of electron-microscope and diffraction study. (M26, Ni)

194-M. The Titanium-Hydrogen System for Magnesium-Reduced Titanium. A. D. McQuillan. *Journal of the Institute of Metals*, v. 79, July 1951, p. 371-378.

The constitution diagram of the above system was studied using Mg-reduced Ti, and the results are compared with those obtained for the same system when Van Arkel Ti was used. It was found that the system cannot be treated as a simple binary, but must be considered as a section through a multicomponent system. The results obtained in study of systems of Mg-reduced Ti with other metals are likely to be affected in the same way. (M24, Ti)

195-M. A Provisional Constitutional Diagram of the Chromium-Titanium System. M. K. McQuillan. *Journal of the Institute of Metals*, v. 79, July 1951, p. 379-390.

The system was studied by quenching methods over the whole range of compositions, and the general nature of the system established. At temperatures between 1360 and 1400° C., the elements appear to be completely soluble in one another; but, on quenching, the solution breaks up to form a compound, Cr_3Ti_2, and a body-centered cubic solid solution based on either the Cr or the β-Ti lattice. The β-Ti solution undergoes a eutectoid transformation at low temperatures to form Cr_3Ti_2 and α-Ti. Mechanism of the contamination of Cr-Ti alloys by O_2 and N_2. Alloys based on the β-Ti solid solution are likely to have useful mechanical properties. (M24, Cr, Ti)

196-M. An X-Ray Study of the Phases in the Copper-Titanium System. Nils Karlsson. *Journal of the Institute of Metals*, v. 79, July 1951, p. 391-405.

The general outline of the phase diagram is drawn. Four intermediate phases were found. The structure of each phase was determined. 16 ref. (M24, Cu, Ti)

197-M. A Further High Temperature α-Phase and a Note on σ—ξ Relations. H. J. Goldschmidt. *Research*, v. 4, July 1951, p. 343.

Existence of a high-temperature intermetallic Fe-Mo compound has been reported, having the structure of the σ-phase FeCr. A number of σ-isomorphs are now known and have been discussed in recent publications. A further compound of the σ-structure was observed, Co-Mo. It has the composition Co_2Mo_2; it is stable at high temperatures only, but the pure σ-form can be retained by quenching, for instance, from 1375° C. Briefly discusses above relationship as observed in various binary and ternary systems, also the temperature effect. 11 ref. (M24, Co, Mo)

198-M. Orientation Measurements on Large-Grained Polycrystalline Sheet. A. E. DeBarr. *Sheet Metal Industries*, v. 28, July 1951, p. 603-607.

Limitations of the various methods and precautions necessary for reliable results. 13 ref. (M26)

N

TRANSFORMATIONS AND RESULTING STRUCTURES

152-N. Zinc Plating Grows a Beard. *Bell Laboratories Record*, v. 29, June 1951, p. 262-263.

A puzzling phenomenon encountered on some precision electrical filters of the hermetically sealed type. A few months after construction, some of these filters showed abnormally high transmission losses to low-level currents. This was found to be caused by growth of fine "whiskers" on the Zn-plated surfaces. These filaments appear to be pure Zn. Similar "whiskers" can be grown on Cd and Sn electrodeposits, but not on Cu; so the latter is being substituted as a plating on steel where considered necessary. (N12, L17, Zn)

153-N. Spherulite Formation in Nodular Cast Iron. A. L. DeSy. *Metal Progress*, v. 59, June 1951, p. 798-801.

Photomicrographs and time-temperature curves for the solidification process. The actual mechanism was not determined; however, it was found that incorporation of minute percentages of strong deoxidizers like Mg, Ce, Li, Ba, Ca, and Sr, give the result; and that the solidification of as-cast nodular Mg-treated Fe corresponds to undercooling without any recalescence. (N12, E25, CI)

154-N. Partial Stabilization of Stainless Steels. Stephen F. Urban. *Metal Progress*, v. 59, June 1951, p. 815.

An attempt was made to melt 18-8 to 0.15% C specification and stabilize part of the C with Ti rather than melt to the customary 0.07% max. C. Tests showed that the desired objective was not obtained. The author believes that similar results would be obtained with Cb and that they are explainable by formation of complex carbides. (N8, SS)

155-N. Aging of Al-Cu-Ti Alloys. *Metal Progress*, v. 59, June 1951, p. 862, 866, 868. (Condensed from "The Effect of Small Quantities of Cd, In, Sb, Tl, Pb, or Bi on the Aging Characteristics of Cast and Heat Treated Aluminum —4% Copper—0.15% Titanium Alloy", H. K. Hardy.)

Previously abstracted from *Journal of the Institute of Metals*. See item 46-N, 1951. (N7, Al)

156-N. Order-Disorder Changes in Alloys. H. Lipson. "Progress in Metal Physics" (Interscience Publishers, New York), p. 1-52.

Superlattice structures described as completely as possible, showing how X-ray diffraction effects arise. 108 ref. (N10)

157-N. Internal Strains and Recrystallization. R. W. Cahn. "Progress in Metal Physics" (Interscience Publishers, New York), p. 151-176.

The processes that occur during the annealing of deformed crystalline solids are usually classified in four groups: recovery, primary recrystallization, grain growth, and secondary recrystallization. A 5th type has only recently been studied systematically; its connection with the others, particularly with primary recrystallization. The discussion centers largely on internal strains present in deformed solids. 75 ref. (N4, N5, Q25)

158-N. Researches on the Polygonization of Metals. A. Guinier and F. Tennevin. "Progress in Metal Physics," (Interscience Publishers, New York), p. 177-192.

Use of a modified Laue diffraction technique to detect differences in orientation of the lattice planes within a crystalline block. A series of experiments on Al samples which display conditions necessary for occurrence of polygonization. Influence of degree of deformation and annealing procedure. (N5, Q24, Al)

159-N. Polygonization in Strongly Deformed Metals. C. Crussard, F. Aubertin, F. Faoul, and G. Wyon. "Progress in Metal Physics" (Interscience Publishers, New York), p. 193-202.

Experimental evidence for polygonization in fine-grained metals heavily cold worked before annealing, based on micrography and X-ray studies, and indirectly on observation of other physical properties (plasticity, thermoelectric power) which are influenced by polygonization. Work was done with Cu and Al. 13 ref. (N5, Q24, Cu, Al)

160-N. X-Ray Data on the Aging of an Al-Cu Alloy. (In Russian.) Yu. A. Bagaryatskii. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 77, Mar. 11, 1951, p. 261-264.

Analyzes results of X-ray investigation of an Al-Cu alloy containing 4% Cu, in order to determine the mechanism of aging. The main factor responsible for natural aging of an Al-Cu alloy appears to be the considerable difference in specific atomic volumes of solid solution and precipitation phases. In Al-Cu-Mg and Al-Ag alloys this difference is insignificant; and hence, the mechanism of aging of these alloys is basically different. 11 ref. (N7, Al)

161-N. The Dissociation Pressures of Thorium Dihydride in the Thorium-Thorium Dihydride System. Manley W. Mallett and Ivor E. Campbell. *Atomic Energy Commission*, AECD-3109, Jan. 31, 1951, 15 pages.

Dissociation pressures were measured in the thorium-hydrogen system for the range of compositions up to approximately ThH 1.90 at temperatures of 650-875° C. Experimental procedure and results. The system resembles the Pd-H system in that the observed dissociation pressures are dependent on the solid-phase composition throughout the system. 10 ref. (N15, Th, EG-h)

162-N. Secondary Recrystallization in Copper Wire. Guido Bassi. *Journal of Metals*, v. 3, July 1951; *Transactions of the American Institute of Mining*

and Metallurgical Engineers, v. 191, 1951, p. 533-534.

Results of X-ray diffraction and micrographic investigation. Effects of different annealing and deformation procedures. (N5, Cu)

163-N. An Experimental Survey of Deformation and Annealing Processes in Zinc. *Journal of Metals,* v. 3, July 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 541-544.

Discussion of above paper by D. C. Jillson. (Aug. 1950 issue; see item 169-N). (N4, N5, Q24, Zn)

164-N. Activation Energy for Recrystallization in Rolled Copper. *Journal of Metals,* v. 3, July 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 548-549.

Discussion of above paper by B. F. Decker and D. Harker. (June 1950 issue; see item 145-N). (N5, P13, Cu)

165-N. Production and Examination of Zinc Single Crystals. *Journal of Metals,* v. 3, July 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 550-551.

Discussion of paper by D. C. Jillson. (Aug. 1950 issue; see item 168-N). (N12, Zn)

166-N. On the Martensitic Transformation at Temperatures Approaching Absolute Zero. *Journal of Metals,* v. 3, July 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 551-553.

Discussion of above paper by S. A. Kulin and Morris Cohen. (Sept. 1950 issue; see item 179-N). (N8, SS, AY)

167-N. The Isothermal Transformation of a Eutectoid Beryllium Bronze. *Journal of Metals,* v. 3, July 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 553-556.

Discussion of above paper by Ronald H. Fillnow and David J. Mack. (Oct. 1950 issue; see item 222-N). (N9, Cu)

168-N. Aging Characteristics of Magnesium-Lithium Base Alloys. *Journal of Metals,* v. 3, July 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 560-561.

Discussion of above paper by P. D. Frost, J. G. Kura, and L. W. Eastwood. (Oct. 1950 issue; see item 227-N). (N7, Q27, R1, Mg)

169-N. Dendritic Crystallization of Alloys. *Journal of Metals,* v. 3, July 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 191, 1951, p. 561-563.

Discussion of above paper by B. H. Alexander and F. N. Rhines. (Oct. 1950 issue; see item 226-N). (N12, EG-a)

170-N. Theory of Grain Boundary Motion. R. Smoluchowski. *Physical Review,* ser. 2, v. 83, July 1, 1951, p. 69-70.

The mobility of grain boundaries in metals is considered from a point of view similar to that used by Mott in his theory of viscosity of grain boundaries. By introducing a factor dependent on surface tension of the grain boundary and inserting the experimental activation energy, satisfactory agreement with experiment was obtained. (N3, P12, Al, Ag, Cu)

171-N. Anisotropy of Diffusion in Grain Boundaries. M. R. Achter and R. Smoluchowski. *Physical Review,* ser. 2, v. 83, July 1, 1951, p. 163-164.

Crystallographic aspects. Experiments consisted in measuring diffusion of Ag along grain boundaries of columnar Cu. The amount of penetration was observed by means of differential etching of silver-rich Cu. (N1, Ag, Cu)

172-N. A Note on the Existence of a Solution to a Problem of Stefan. G. W. Evans, II. *Quarterly of Applied Mathematics,* v. 9, July 1951, p. 185-193.

When certain metals are heated slowly, the temperature rises until it reaches a critical temperature at which the structure of the metal changes from one crystalline form to another. Accompanying this change of crystalline form is a latent heat of recrystallization. In order to study the process, the associated mathematical problem, which requires solution of a partial differential equation in a region with an undetermined boundary, was investigated. (N5)

173-N. Magnetic Analysis of Iron-Carbon Alloys; The Tempering of Martensite and Retained Austenite. J. Crangle and W. Sucksmith. *Journal of the Iron and Steel Institute,* v. 168, June 1951, p. 141-151.

Observation of structure-insensitive magnetic properties is used to examine the phases involved when quenched pure Fe-C alloys are reheated. During the first stage of the martensite breakdown a ferromagnetic phase different from cementite is precipitated; some of its magnetic properties are indicated. Retained austenite is found to change into the same state as martensite. After heating to 300° C., cementite and another carbide were found to be present. 26 ref. (N8, P16, CN)

174-N. Some Reactions in the Iron-Carbon System: Application to the Tempering of Martensite. L. J. E. Hofer and E. M. Cohn. *Nature,* v. 167, June 16, 1951, p. 977-978.

The following reactions were observed and are discussed and diagrammed: $Fe_3C + a \rightarrow Fe \rightarrow Fe_3C$, and $3Fe_2C \rightarrow 2Fe_3C + C$. 14 ref. (N8, Fe, ST)

175-N. Annealing of Martensite in Steels. (In French.) André Michel. *Bulletin du Cercle d'Etudes des Métaux,* v. 5, Sept.-Dec. 1950, p. 337-356; disc., p. 356-357.

Origin of martensite in the annealing process under various conditions and for various kinds of steel. (N8, J23, ST)

176-N. Crystal Orientation During Cementation. (In French.) Félix Bertaut and Pierre Blum. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 232, Apr. 23, 1951, p. 1566-1568.

Orientations obtained by cementation reactions, and due, not to epitaxy, but to anisotropy of the rate of growth, hence to the structure of the substance at which the reaction takes place. These reactions were accomplished by fused-salt electrolysis, on flat surfaces or cylindrical wires immersed in the appropriate cementation bath. Results obtained with Fe_2B, Co_2B, Ni_2B, MoB, Fe_2As, Fe_2P, Ni_2P, FeB, CoB, Co_2Si, Co_2P, and NiB. (N12)

177-N. Study of the Reactions of Cementation in Thin Iron Films. (In French.) J. J. Trillat and S. Oketani. *Métaux: Corrosion—Industries,* v. 26, Apr. 1951, p. 145-152.

Studied by electron diffraction for CO and for $CO+H_2$. Carburization differs greatly in the two cases and the rate of reaction is greatly affected by presence of H_2. In the latter case, a percarbide forms. 13 ref. (N8, Fe)

178-N. Research on Formation of Heterogeneous Coarse Crystals in Al-Mg-Mn Alloys. (In Italian.) M. Monticelli-Papania. *Alluminio,* v. 20, 1951, p. 136-146.

Shows that separation of coarse $MnAl_6$ crystals in above alloys is caused by a high Fe content, rather than by undercooling or by non-uniform chemical constitution. For Mn contents up to 1.6+, Fe should not exceed 0.2%. (N12, Al)

179-N. Graphite Formation in Heat Resistant Molybdenum Steels. (In German.) Hans-Joachim Wiester. *Archiv für das Eisenhüttenwesen,* v. 22, May-June 1951, p. 177-184.

Correlates and analyzes literature on effects of composition, heat treatment, welding procedures, stresses, and deformations on graphitization of 0.15-0.50% Mo in the presence of steam at elevated temperatures and pressures. (N8, AY)

180-N. Recovery Phenomena of Beryllium-Copper Alloys. (In German.) W. Gruhl. *Metall,* v. 5, June 1951, p. 231-238.

Results of experiments confirm the validity of Dehlinger's and Becker's theories of the limits of single-phase precipitation in binary systems. Resistance measurements and X-ray studies prove the reversibility of heterogeneous precipitation and thus demonstrate the validity of Becker's theory of nuclei formation. 12 ref. (N4, Cu)

181-N. Measurement of Carbon Diffusion in Metallic Carbides. G. C. Kuczynski and R. Landauer. *Journal of Applied Physics,* v. 22, July 1951, p. 952-955.

A method for measuring the above is proposed. Rate at which excess metallic inclusions are consumed by carbon diffusing in from a surface is used to indicate the extent to which diffusion has taken place. Conditions are derived under which the results are susceptible to simple analytical treatment. (N1, C-n)

182-N. Allotropy of Beryllium. A. U. Seybolt, Joseph S. Lukesh, and D. W. White. *Journal of Applied Physics,* v. 22, July 1951, p. 986.

Questions conclusions of a recent report by Sidhu and Henry that Be has two co-existing allotropic phases at room temperature. (N6, Be)

183-N. Some Theoretical Aspects of Nucleation. R. M. Butler. *Journal of the Imperial College Chemical Engineering Society,* v. 5, 1949, p. 98-144.

Describes, from a simple thermodynamic viewpoint, reasons for existence of those metastable phases which are significant in a large number of physical processes—chemical engineering, metallurgy, glass industry, and meteorology. (N2)

184-N. The Ageing Characteristics of Binary Aluminium-Copper Alloys. H. K. Hardy. *Journal of the Institute of Metals,* v. 79, July 1951, p. 321-369.

Hardness vs. aging-time curves were obtained on Al alloys containing 2.0-4.5% Cu between 30 and 240° C. Results were analyzed in terms of hardness/concentration, time/concentration, and temperature/time relationships for various parts of the aging curves. They are discussed with reference to a recent thermodynamic analysis of the decomposition of supersaturated solid solutions by H. K. Hardy. Conditions for alloy systems with a negative heat of solution are applied. 73 ref. (N7, Al)

185-N. Isothermal Transformation Diagrams for Nickel Steels. II. Practical Applications and Diagrams for Individual Steels. *Metallurgia,* v. 43, June 1951, p. 280-288.

Includes numerous graphs and tables. (N8, AY)

186-N. Effect of Temperature on Carbon Steel in Refinery Vessels Being Surveyed. V. B. Guthrie. *Petroleum Processing,* v. 6, July 1951, p. 719-721.

Study being conducted by the API Committee on Refinery Equipment and other technical groups. Emphasizes the occurrence and causes of graphitization. (N8, T29, CN)

187-N. Principal Metallurgical Mechanisms Encountered in Transforming Metals and Alloys. (In French.) Jean Hérenguel. *Revue de l'Aluminium,* v. 28, May 1951, p. 171-177.

Heterogeneous textures of various

alloys, resulting from soluble and insoluble phases, and ways of minimizing them by heat treatment, quenching, hardening, and precipitation annealing. Emphasis is on Al and its alloys. Note is appended on crystallographic rotation. Includes photomicrographs and 11 ref.
(N general, J general, Al)

188-N. On the Aging of Al-Mg Alloys. (In French.) H. Jolivet and M. Armand. *Revue de Métallurgie*, v. 48, May 1951, p. 376-378; disc., p. 378.

The above alloys, when homogenized and quenched in cold water, show at ordinary temperature, a phenomenon of aging which is characterized by contraction, increased hardness, some increase in limit of elasticity and resistance to rupture, and by a significant decline in the values of elongation, rupture, and resistance. (N7, Q general, Al, Mg)

189-N. Second Report of the Committee on Boron Steels. Part I. Effect of Boron on Commercial Ingots Containing Small Amounts of Ni, Cr, and Mo. Part II. Study of the Effects of Boron Additions to Small Carbon Steel and Low-Alloy Steel Castings. (In French.) R. Potaszkin and M. Jaspart. *Revue de Métallurgie*, v. 48, May 1951, p. 379-412; disc., p. 412.

Results of extensive experimental investigation of transformation, structures, and mechanical properties. (N8, M27, Q general, AY)

190-N. (Book) **Progress in Metal Physics. Vol. 2.** Bruce Chalmers, editor. 213 pages. 1950. Interscience Publishers, 250 Fifth Ave., New York 1, N. Y. $8.00.

Second of series of review volumes consists of seven papers by different authors covering different aspects of physical metallurgy. Individual papers are abstracted separately.
(N general, P general)

P

PHYSICAL PROPERTIES AND TEST METHODS

212-P. Changing Properties of Metals by Bombarding With Electrons. *Automotive Industries*, v. 104, June 15, 1951, p. 41.

One of the latest pieces of equipment at the Atomic Research Laboratory of North American Aviation, Downey, Calif. The Statitron is a machine to displace atoms and thus change the physical properties of metals. The amount of energy required for displacement can be ascertained by determining the extent of changes in physical properties, such as electrical resistance of various metals. Applications are not discussed. (P15, Q25)

213-P. The Vapor Pressure of Zinc in the Range 300°-360° C. John E. Vance and Charles I. Whitman. *Journal of Chemical Physics*, v. 19, June 1951, p. 744-748.

Vapor pressure was measured, using Knudsen's effusion method. Temperature-vapor pressure relation was determined in the above range. These results are about 20% higher than those previously reported. Suggests that this difference may be attributed principally to omission of a probability factor by earlier workers. 12 ref. (P12, Zn)

214-P. Absolute Rate of the Chemisorption of Hydrogen on Reduced Copper. Takao Kwan and Masaharu Kujirai. *Journal of Chemical Physics*, v. 19. June 1951, p. 798-799.

Calculations based on previously reported experimental data. Results indicate that the surface atoms of Cu are equally capable of chemisorbing H_2 molecules; therefore, the belief that only a few "active centers" appear to be responsible for chemisorption. (P13, Cu)

215-P. Thermal Conductivity of Various Materials vs. Temperatures. *Materials & Methods*, v. 33, June 1951, p. 107.

Graph gives curves for aluminized steel, pure Fe, cast iron, low-carbon steel, wrought Ni, SAE 4140, Inconel-clad Ni, stainless-clad steel, Inconel X, Vitallium HS-21, and Types 302, 321, 347, and 430 stainless steel. (P11)

216-P. Rate Processes in Physical Metallurgy. I. I. Betcherman. "Progress in Metal Physics" (Interscience Publishers, New York), p. 53-89.

Indicates how some aspects of the behavior of metals and alloys can be considered in terms of the concept of "activation energy". Among the topics discussed are: application of thermodynamics; rate processes in metallurgy; precipitation by nucleation and growth; flow of solid metals; stress-strain relationships in metals; and superlattices. 43 ref.
(P12, N2, N3, N10)

217-P. Anisotropy in Metals. W. Boas and F. K. Mackenzie. "Progress in Metal Physics" (Interscience Publishers, New York), p. 90-120.

Fundamental principles. Variation in physical and mechanical properties of crystals with orientation. Experimental results on bulk and anisotropic properties of a wide variety of metals. Anisotropic variations of surface properties and effects of anisotropy in polycrystalline metals. 75 ref. (P general, Q general)

218-P. Factors Affecting the Solubility of Carbon in Iron. R. V. Reily. *Institute of British Foundrymen*, Advance Paper 997, 1951, 14 pages.

Experiments carried out in laboratory furnaces in which carefully controlled conditions were maintained. C solubility in Fe was determined in selected atmospheres of H_2, O_2, N_2, and air, at normal and low pressures and in vacuum. Shows that available knowledge on the form of liquidus of Fe-C alloys containing over 4.5% C is incomplete. Carbon solution rates in high-carbon cast iron are in conformity with the general laws relating to solution of a solid in a liquid. Shows that normal cupola atmosphere is not conductive to the production of high-C Fe. CaC_2 additions raise the C content of cupola-melted Fe.
(P12, E10, CI)

219-P. Slow Neutron Cross-Sections of Zirconium and Hafnium. P. A. Egelstaff and B. T. Taylor. *Nature*, v. 167, June 2, 1951, p. 896-897.

Results of spectrometric measurements. (P10, Zr, Hf)

220-P. Microcalorimetry and Possibilities of Its Application in the Study of Metals and Alloys. (In Czech.) O. Hajicek. *Hutnické Listy*, v. 6, Mar. 1951, p. 111-119.

Although the main field of application of microcalorimetry appears to be the study of radioactive materials, of thermal phenomena of various chemical and physicochemical reactions, and in physiology and biology, it is also shown to be useful in the study of metals and alloys. 31 ref. (P12, M23)

221-P. Influence of Adsorption of Gas on Melting of Crystalline Solids. (In French.) Hubert Forestier and J. Maurer. *Comptes Rendus hebdomadaires des Seances de l'Académie des Sciences*, v. 232, Apr. 30, 1951, p. 1664-1666.

Evidence showing that melting point varies with the gaseous atmosphere present. This effect is caused by surface adsorption of gas by the crystals. The effect was studied in LiCl, KNO_3 Pb. and Sn in He, H_2, Ne, A, and CO_2. Variations of as much as 4° C. were noted.
(P12, Bi, Pb, Sn)

222-P. Origin of Intermittent Activation in Ferromagnetic Substances. (In French.) Robert Forrer. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 232, May 7, 1951, p. 1746-1748.

Theoretical analysis of the phenomenon of ferromagnetism of metals and alloys of the Fe group. Atomic spacing is shown to play a double role. Ferromagnetic behavior of V, Cr, Mn, Fe, Co, and Ni.
(P16, U, V, Cr, Mn, Fe, Co, Ni)

223-P. Secondary Electron Emission Properties of Ni, Mo, MgO, and Glass. (In German.) G. Blankenfeld. *Annalen der Physik*, ser. 6, v. 9, Mar. 15, 1951, p. 48-56.

Experimental study made to determine the effect of temperature using different primary electron energies. 10 ref. (P15, Ni, Mo)

224-P. Temperature of Two Metals in Contact. W. Karush. *U. S. Atomic Energy Commission*, AECD-2967, Dec. 22, 1944, 6 pages.

A theoretical consideration using schematic models to describe the nature of the contact between the metals. Considers the case of a chemical reaction where it is desirable to know the highest temperature at which the metals might come in contact. Shows that it is always possible with the models to have two metals in contact at a temperature as great as the larger of the two surface temperatures. (P11)

225-P. A Proposed Standard Method for Measuring the Electrical Resistance of Pipe Line Coatings. Walter F. Rogers, B. H. Davis, Lyle Sheppard, L. G. Sharpe, E. R. Allen, Donald Bond, and P. T. Miller. *Corrosion* (Technical Section), v. 7, July 1951, p. 245-251.
(P15, L26, ST)

226-P. Ignition Temperatures of Magnesium and Magnesium Alloys. W. Martin Fassell, Jr., Leonard B. Gulbransen, John R. Lewis, and J. Hugh Hamilton. *Journal of Metals*, v. 3, July 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 522-528.

Simple reproducible method developed for determining the above on Mg and over 100 Mg alloys. The ignition temperature of Mg was determined in O_2-SO_2 and O_2-N_2 mixtures and in O_2 from 0.166 to 10 atm. pressure. The ignition temperature is generally lowered by alloying and increased by an increase in O_2 pressure. 15 ref. (P12, Mg)

227-P. A Thermodynamic Study of the Reaction $CaS + H_2O \rightleftarrows CaO + H_2S$ and the Desulphurization of Liquid Metals With Lime. Terkel Rosenqvist. *Journal of Metals*, v. 3, July 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 535-540.

Apparatus and procedure. Applications to desulfurization of molten Cu and Fe were both thoroughly studied. 13 ref. (P12, Cu, Fe)

228-P. The Measurement of Interlaminar Resistance of Varnish-Insulated Silicon-Steel Sheet for Large Electrical Machines. E. D. Taylor. *Proceedings of the Institution of Electrical Engineers*, v. 98, pt. 2, June 1951, p. 377-385; disc., p. 385-388.

The fundamental problem is essentially statistical. Suggests a method by which it may be solved. Possibility of correlation between experimentally measured values of resistance and observed stray losses in complete machines. Other relevant factors, such as temperature, pressure, and nature of the plate surface. (P15, AY, SG-p)

229-P. Thermoelectric Properties of Titanium With Special Reference to

the Allotropic Transformation. H. W. Worner. *Australian Journal of Scientific Research*, ser. A, v. 4, Mar. 1951, p. 62-83.

A differential method for determining the thermo-electric power of Ti-Pt thermocouples. Results of the differential measurements are compared with data obtained in direct e.m.f. temperature determinations. From the results, temperature dependency of the following properties was deduced: Peltier coefficient of the Ti-Pt couple; difference between the Thomson coefficients of Ti and Pt; and absolute thermo-electric power of Ti. Shows that abrupt changes in thermo-electric properties accompany the α-β transformation in refined Ti. Some effects due to preferred orientation and their elimination. (P15, N6, Ti, Pt, SG-a)

230-P. The Critical Magnetic Fields of Aluminium, Cadmium, Gallium and Zinc. B. B. Goodman and E. Mendoza. *Philosophical Magazine*, ser. 7, v. 42, June 1951, p. 594-602.

Low temperatures produced by the adiabatic demagnetization of a paramagnetic salt were used to cool specimens of Al, Cd, Ga, and Zn; their critical fields were measured down to 0.1° K. The temperature variation of the critical fields is plotted for each metal. 13 ref. (P16, Al, Cd, Ga, An)

231-P. The Thermal Conductivity of Some Alloys at Low Temperatures. R. Berman. *Philosophical Magazine*, v. 42, June 1951, p. 642-650.

Thermal conductivities of German silver, stainless steel, and Constantan were determined between 2 and 90° K.; and electron and lattice components of the conductivity were calculated. A table shows the heat flow along specimens of each alloy resulting from temperature differences commonly met with in low-temperature work. 12 ref. (P11, Cu, SS, Ni)

232-P. Ferromagnetism of the Alloy $FeBe_2$. (In French.) André J. P. Meyer and Pierre Taglang. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 232, Apr. 23, 1951, p. 1545-1546.

Ferromagnetic properties were investigated. Results indicate that the Curie point is located at 643° C. Thermal-analysis further reveals the existence of a temperature of magnetic isotropy at 468° C. Above the Curie point, this alloy showed normal paramagnetism. The ferromagnatism of $FeBe_2$ may be considered as an additional argument for the hypothesis of orbital contraction in this type of alloy. Crystallography and magnetic constants of this alloy. (P16, Fe, Be)

233-P. Preparation and Magnetic Properties of Gadolinium-Magnesium Alloys Rich in Mg. (In French.) Francoise Gaume-Mahn. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 232, May 16, 1951, p. 1815-1816.

A thermomagnetic method for determining the presence of Gd in Mg. Preparation methods and magnetic properties for Gd-Mg alloys containing 5.3-68.2% Gd. (P16, Mg, Gd)

234-P. Ferromagnetism of the β_1-Phase of Cd-Zn Alloys. (In French.) Andre J. P. Mever and Pierre Taglang. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 232, May 21, 1951, p. 1914-1916.

A method for preparing an alloy of the desired Zn proportion for revealing the phase desired. Results of experiments. (P16, Co, Zn)

235-P. Effect of Radioactivity on Thermoelectronic Emission of Cathodes. (In French.) Jean Debiesse, Georges Neyret, Jean Challansonnet, and Jacques Amoignon. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 232, May 28, 1951, p. 2015-2016.

Research in progress on use of radioactive cathodes made of Ni alloys containing Co. (P15, Ni)

236-P. Chemical and Metallurgical Equilibria in the Work of Henry Le-Chatelier and in Experimental Science. (In French.) Maurice Rey. *Revue de Métallurgie*, v. 48, Mar. 1951, p. 161-172.

Fundamental principles of chemical equilibria of pure solids at high temperatures and equilibria of solutions, including metallic solutions and slag-metal equilibria. Includes graphs. 14 ref. (P12)

237-P. Atomic Magnetic Momenta of Fe, Co, and Ni. (In Russian.) N. S. Akulov and T. I. Kahushadze. *Doklady Akademii SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 77, Apr. 1, 1951, p. 593-596.

Investigation on the basis of Bohr's theory. Results indicate that the divisibility of atomic magnetic momenta and their inequality below and above the Curie point are inevitable results of the theory of interaction of electrons in the *s* and *d* bands. This theory also makes it possible to determine atomic magnetic momenta of Fe and Co at rather high temperatures. (P16, Fe, Co, Ni)

238-P. The Melting Point and the Density of Neptunium Metal. A Micro Melting Point Apparatus for Metals. Edgar F. Westrum, Jr. and LeRoy Eyring. *Journal of the American Chemical Society*, v. 73, July 1951, p. 3399-3400.

Np metal was prepared on a milligram scale by reduction of NpF_3 with Ba. The melting point was determined. Density was found to be 19.5. An apparatus was designed for measurement of melting points of 10-1000 microgram samples of metals. (P12, P10, Np)

239-P. Electrical Properties of Selenium: I. Single Crystals. H. W. Henkels. *Journal of Applied Physics*, v. 22, July 1951, p. 916-925.

Crystals of hexagonal Se were grown in a melt. Their microstructures were compared with those arising in vapor crystals. Dark resistivity was studied as a function of axis orientation, temperature, field, and time of application of a field. Thermo-electric power was measured and attempts made to measure Hall effect. Nature of the acceptor levels, approximate hole densities and mobilities, and values of activation energies. 14 ref. (P15, M26, Se)

240-P. Heat Conduction in Simple Metals. M. L. Storm. *Journal of Applied Physics*, v. 22, July 1951, p. 940-951.

Theoretical, mathematical analysis of relations between thermal parameters of simple metals on the bases of the theory of solids and available experimental data. Applications of the transformed equation to solution of problems in heat conduction. 26 ref. (P11)

241-P. Iron-Silicon Alloys Heat Treated in a Magnetic Field. Matilda Goertz. *Journal of Applied Physics*, v. 22, July 1951, p. 964-965.

Magnetic annealing was found effective for Fe-Si alloys between 2 and 10% Si, the highest maximum permeability being obtained at about 6.5%. (P16, J23, Fe, SG-n, p)

242-P. The Initial Susceptibility of Nickel Under Tension. H. J. Peppiatt and B. N. Brockhouse. *Journal of Applied Physics*, v. 22, July 1951, p. 985-986.

Results of experimental study obtained with 99.99% pure Ni wire between −40 and 120° C. (P16, Ni)

243-P. A Mechanical Model to Illustrate the Collision Mechanism of Solute Atoms or Molecules in Reactions in Liquid Solution and in Reactions at the Surface of an Interstitial Solid Solution. K. H. Jack. *Research*, v. 4, July 1951, p. 329-330.

Diagram shows model which illustrates the principle used to explain reaction mechanisms in liquid solutions and which has also been recently applied to explain the collision mechanism of N atoms at the surface of Fe-N interstitial alloy. (P13, Fe)

244-P. The Physics of Sheet Steel. (Concluded.) G. C. Richer. *Sheet Metal Industries*, v. 28, July 1951, p. 597-602, 608.

Plastic deformation and recrystallization and their relationships to ferromagnetic properties. Includes summary discussion covering the entire series. 31 ref. (P16, Q24, N5, ST)

245-P. Application of Thermodynamics to the Manufacture of Iron and Steel. (In French.) Charles Goodeve and J. Pearson. *Revue de Métallurgie*, v. 48, May 1951, p. 329-335; disc., p. 335.

Reviews the above and considers desulfurization and dephosphorization. 15 ref. (P12, ST)

246-P. Wetting of Metals by Water. (In German.) J. L. v. Eichborn. *Werkstoffe und Korrosion*, v. 2, June 1951, p. 212-221.

Results of investigation and original experiments with Hg. Survey of surface tensions and heat of adsorption of metallic catalysts yields comparative values for adsorptive ability of various metallic surfaces. Proposes hypothesis for adhesion of traces of water. 67 ref. (P10, Hg)

247-P. Le Chatelier's Principle and Its Metallurgical Applications. (In French.) M. B. Bever and R. Rocca. *Revue de Métallurgie*, v. 48, May 1951, p. 363-368.

The principle is reviewed and applied to effects of temperature and pressure changes on chemical reactions and phase changes. 32 ref. (P12)

248-P. The Densities of Liquid Mg_2Pb and Mg_3Bi_2. (In German.) Oswald Kubaschewski and Reinhold Hörnle. *Zeitschrift für Metallkunde*, v. 42, May 1951, p. 129-132.

Experiments show that Mg_3Bi_2 contracts when formed in the solid state, but expands when formed in the molten state, while Mg_2Pb manifests the opposite behavior. Volume changes in formation of liquid alloys are discussed on the basis of known data on metallic, homopolar, and heteropolar bonding mechanisms. 17 ref. (P10, Mg, Bi, Pb)

249-P. Are There Magnetic Indications of Negative Cobalt and Iron Ions in Alloy Melts and Very Dilute Solid-Solution Alloys? (In German.) Eckhart Vogt. *Zeitschrift für Metallkunde*, v. 42, May 1951, p. 155-158.

Magnetic measurements of Weil on melts of Co and Fe with Au, Zn, and Sb; and those of Bitler and coworkers on very dilute solid-solution alloys of Fe in Cu at very low temperatures. 13 ref. (P16)

Q

MECHANICAL PROPERTIES AND TEST METHODS; DEFORMATION

363-Q. Observations of the Effect of Time on Physical Properties of Small Tanks. T. L. White. *American Society for Mechanical Engineers*, Paper 50-PET-26, 1950, 15 pages.

Numerous tests made over a period of years on spherical vessels, each composed of two hemispheres, show changes in physical properties of the steel over a period of time.

The hemispheres are designed to store liquefied-petroleum gas at atmospheric temperatures. They were all cold formed, welded, and hydrostatically tested in a similar manner. They were made of openhearth semi-killed flange quality steel conforming to ASME Specification Sa-285, grade C. (Q general, CN)

364-Q. An Arbitration Bar Izod Impact Test for Cast Iron. J. T. Eash and A. P. Gagnebin. *American Society for Testing Materials,* Preprint 15, 1951, 8 pages.

An impact test for cast iron consisting of breaking a section of an unmachined bar in a modified Izod machine. Dimensional constants of the machine. Illustrative data show that the system accommodates various types of cast iron with impact values ranging from 10 ft-lb. for high-phosphorus gray irons to over 120 ft-lb. for austenitic cast irons. (Q6, CI)

365-Q. Planning and Interpretation of Fatigue Tests. Alfred M. Freudenthal. *American Society for Testing Materials,* Preprint 16, 1951, 11 pages.

Significance of the scatter of results of fatigue tests and inadequacy of conventional procedures for their planning and interpretation. An attempt is made to derive the cumulative frequency distribution function of fatigue life, at any particular stress amplitude, from considerations of statistical theory. Results of rotating-beam and reversed torsion-fatigue tests on steel, Al, and Cu are shown to approximate the theoretically derived distribution. 15 ref. (Q7)

366-Q. Effect of Residual Stress on the Fatigue Strength of Notched Specimens. D. Rosenthal and G. Sines. *American Society for Testing Materials,* Preprint 17, 1951, 16 pages.

Previous investigations have established that residual stress definitely affects fatigue strength of metal parts, but no quantitative relations have been derived to predict actual performance. An attempt was made to overcome two of the major obstacles: the presence of other factors and partial relief of residual stress. Tests were performed on notched 61S Al alloy. Residual stress, both compressive and tensile, was set up at the base of the notch by a process of overstressing which created only negligible cold working, and an X-ray stress technique was used to follow change of residual stress during testing. (Q7, Q25, Al)

367-Q. Fatigue Strength of Ball Bearing Races and Heat-Treated 52100 Steel Specimens. Haakon Styri. *American Society for Testing Materials,* Preprint 23, 1951, 15 pages.

Failures of ball bearings by spalling or flaking usually start from points below the contacting surfaces, and considerable variation of heat treatment has little influence on the scatter. Tests were run on ring-type, rotating-beam-type, Krouse-type, and torsion-type specimens. Concludes that the fatigue failures in bearings start at local weakness points in a region under the rolling contact path where shear stresses are high. 15 ref. (Q7, AY)

368-Q. The Fatigue Tests as Applied to Lead Cable Sheath. G. R. Gohn and W. C. Ellis. *American Society for Testing Materials,* Preprint 24, 1951, 20 pages.

Important factors affecting the design of laboratory test methods suitable for obtaining significant fatigue data from reversed bending tests on cantilever-beam specimens of Pb cable-sheathing alloys. Effect of cycling rate, temperature, shape of specimen, alloy additions, and aging on fatigue life. Fatigue data in terms of cycle life vs. deflection. cycle life vs. strain, and cycle life vs. stress. 21 ref. (Q7, Pb)

369-Q. Compression Tests on Lead Alloys at Extrusion Temperatures. G. M. Bouton and G. S. Phipps. *American Society for Testing Materials,* Preprint 26, 1951, 10 pages.

Load-deflection measurements made during compression tests on Pb and Pb alloy cylinders at various temperatures show effects of alloying ingredients on force required to produce deformation. The curves also furnish clues as to changes taking place in the materials during the test. Elements added to Pb were those most commonly used in the manufacture of cable sheath, namely, Sb, As, Bi, Ag, Te, and Sn. Results show that the stronger alloys now used in cable sheathing deform less readily at extrusion temperatures than pure Pb or the weaker alloys. (Q28, Pb)

370-Q. Laboratory Evaluation of Materials for Marine Propulsion Gears. M. R. Gross. *American Society for Testing Materials,* Preprint 38, 1951, 16 pages.

Results of tests made to evaluate pitting resistance and root fatigue strength of materials for marine gears. By means of contact-roller test machines, pitting limits were determined for six steels and eight nonferrous materials. A new test called the "simulated gear-tooth fatigue test" was developed to evaluate root fatigue strength under reserved bending stresses. Effects of hardening treatments, root radii, and surface finish and treatments on endurance limit of the root area was determined for three steels. (Q7, T7)

371-Q. Rheotropic Brittleness; General Behavior. E. J. Ripling and W. M. Baldwin, Jr. *American Society for Testing Materials,* Preprint 39, 1951, 8 pages.

The brittle behavior of a metal with a hexagonal-type crystal structure (pure Zn) at temperatures less than the transition value was found to be largely strain curable (rheotropic). This suggested that rheotropism, heretofore reported only in steels, is a general property of materials that show a transition temperature. Shows the low ductility of Zn at high strain rates to be rheotropic. Since the brittleness of notched steels was recently found to be rheotropic, it can be assumed that brittleness induced by any of the three known embrittling variables is strain-sensitive. (Q23, Zn)

372-Q. Report of Committee E-1 on Methods of Testing. J. R. Townsend, chairman. *American Society for Testing Materials,* Preprint 83, 1951, 71 pages.

Includes "Report on the Principles Involved in the Determination of Absolute Viscosity," by W. H. Markwood, Jr., editor, (70 ref.); methods for compression testing of metallic materials in sheet and other forms; proposed revision of tentative recommended practice for microscopic analysis of particle size distribution of subsieve size material; methods for softening point by ring-and-ball apparatus; and for tension testing of metallic materials. (Q general)

373-Q. Evaluation of the Anti-Wear Properties of Gear Greases. N. J. Ninos. *Institute Spokesman,* v. 15, June 1951, p. 8-9, 11-13, 15-18, 21-23, 25-27.

Work done using the Navy gear wear tester to evaluate the anti-wear characteristics of synthetic low-temperature greases for lubrication of brass-on-steel surfaces, and to supplement other bench-test data by employing metallic combinations of dissimilar metals in the form of gears. Based on statistical treatment a curve was developed which determined what significance can be attached to differences between wear rates of two different greases. Tabular data for Government Specification greases on brass-on-steel test pieces are included, as well as correlative data on phosphor bronze, 24S-T Al, and SAE 4130 steel. (Q9, Cu, ST, Al)

374-Q. Some Extensions of Elementary Plasticity Theory. F. Edelman and D. C. Drucker. *Journal of the Franklin Institute,* v. 251, June 1951, p. 581-605.

Detailed investigation of yield or loading criteria for work hardening materials, which lead to constant strain ratios under increasing stress when stress ratios are maintained constant. The experimenter is given a choice of incremental stress-strain theories with which results of simple or complicated combined loading tests may be correlated. Loading functions of isotropic as well as anisotropic types. Predicted results of some basic tests for several loading criteria. 10 ref. (Q23)

375-Q. Hydrogen Theory for Brittle Ship-Plate. Carl A. Zapffe. *Metal Progress,* v. 59, June 1951, p. 802-808.

History of the internal-cracking defect in steel known as "flaking" Use of fractography to study the general problem of ship-plate fracture. The H_2 theory of brittle ship plate and effects of this element on weld metal. 20 ref. (Q23, CN)

376-Q. Free Cone Bend Test. *Metal Progress,* v. 59, June 1951, p. 840, 842. (Condensed from "A Free Cone Bend Test for Aluminum Alloy Sheet and Coil", W. Thompson, Report A.I.D./MET/9, *Aeronautical Inspection Department,* Harefield, England.)

Procedure designed to determine the limiting radius of bend in a single operation. Since the region of the test piece undergoing deformation is not restrained, errors due to frictional effects, or local decreases in curvature, are eliminated. (Q5)

377-Q. Plastic Deformation of Chromium-Plated Steel for Aircraft. *Technical News Bulletin* (National Bureau of Standards), v. 35, June 1951, p. 79-80. (Condensed from article by Hugh L. Logan.)

Previously abstracted from *Journal of Research of the National Bureau of Standards.* See item 344-Q, 1951. (Q24, L17, AY, Cr)

378-Q. Strain Aging of Pressure Vessel Steels. Helmut Thielsch. *Welding Journal,* v. 30, June 1951, p. 283s-290s.

Interpretation of strain aging in terms acceptable to the non-metallurgist. Effects of the steelmaking process, composition, heat treatment, fabrication, and welding. 45 ref. (Q25, CN)

379-Q. Interpretive Report, Fabrication Division, Pressure Vessel Research Committee. *Welding Journal,* v. 30, June 1951, p. 291s-302s.

A series of short discussions by different authors of above paper by H. C. Boardman. See item 647-Q, 1950. They are followed by the author's reply. (Q23, K general, T26, ST)

380-Q. Falling-Weight Impact Test of Welded Aluminum Alloy Plates. E. C. Hartmann. *Welding Journal,* v. 30, June 1951, p. 303s-306s.

A new test and equipment for comparing the resistance of welded plates to shock loadings at various temperatures. (Q6, K9, Al)

381-Q. The Influence of Biaxiality on Notch Brittleness. *Welding Journal,* v. 30, June 1951, p. 319s-320s.

Discussion of above paper by D. Rosenthal and W. D. Mitchell. See item 646-Q, 1950. Includes authors' reply. (Q23, CN)

382-Q. Brittle Lacquer Stress Analysis. R. H. Warring. *Machinery Lloyd*

(Overseas Edition), v. 23, May 26, 1951, p. 76-79, 81, 83.

Equipment and procedures applied to different shapes. Types of lacquers, methods of use, and limitations. (Q25)

383-Q. Investigation of Cast Secondary Aluminium Alloys; Fatigue Tests. J. Wood. *Metal Industry*, v. 78, June 8, 1951, p. 459-462.

Results of an experimental program designed to determine the fatigue strength of Intal 305 and 308 in both the sand-cast and chill-cast conditions. For purposes of comparison, tests were also made on DTD 424. (Q7, Al)

384-Q. Photoelastic Laboratory at the National Physical Laboratory. A. F. C. Brown and V. M. Hickson. *Engineering*, v. 171, June 8, 1951, p. 701-704.

Detailed description of facilities. Aims of the section are twofold: to provide facilities for photoelastic stress analysis and to evaluate known methods, to improve them and to develop new methods. (Q25)

385-Q. Yield Phenomenon and Twinning in α-Iron. A. T. Churchman and A. H. Cottrell. *Nature*, v. 167, June 9, 1951, p. 943-945.

Relates the above phenomena, and gives results of experiments. (Q24, Fe)

386-Q. The Deformation and Aging of Mild Steel. W. Sylwestrowicz and E. O. Hall. *Proceedings of the Physical Society*, v. 64, sec. B, June 1, 1951, p. 495-502.

Mild steel deforms by a series of bands of plastic deformation called Lüders bands. In heavy tensile specimens, a complex series of bands may appear, but in thin wire specimens only single bands are formed. Measurements of propagation stress and Lüders strain for these single bands, and effects which occur on aging deformed specimens. Current theories of the upper yield point—the stress at which bands first appear. 16 ref. (Q24, CN)

387-Q. The Origins and Causes of Fractures in Some Types of Steels. (In Czech.) Vladimir Koselev. *Hutnické Listy*, v. 6, Mar. 1951, p. 106-110; Apr. 1951, p. 165-179.

Factors responsible. Defines real and apparent grains, pseudo-morphism, intercrystalline, fractures, etc. Various characteristic types of fractures with special reference to plane fracture and sorbitic and pearlitic steel fracture. Suggests that pearlitic steel fracture is influenced by extent and number of defective spots, represented by the boundary planes of the blocks of cementite as well as the pearlite-ferrite boundaries. (Q26, ST)

388-Q. Determination of Residual Stresses in a Case-Hardened Steel Cylinder. (In French.) Jacques Pomey, Louis Abel, and Pierre Yenin. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 232, Apr. 30, 1951, p. 1641-1643.

Investigation, particularly of the development of stresses during tempering. It was found that the carburized layer is hardened during bainitic isothermal transformation of the core, so that the stresses due to martensite transformation are predominant. Method for determination of such stresses. Equations are interpreted for different values of the variables. (Q25, N8, J29, ST)

389-Q. Study of Fatigue Strength of Welded Structures. (Continued.) (In French.) W. Soete and R. Van Crombrugge. *Revue de la Soudure: Lastijidschrift*, v. 6. No. 4, 1950, p. 199-212.

Low-carbon structural-steel test specimens were used. Types of fracture of welds under static and fatigue stress; tests for determination of fatigue characteristics; and influehce of type of electrodes used on strength of welds. (Q7, K9, CN)

390-Q. Mechanical Strength of Silver-Brazed Joints. (In French.) C. D. Coxe and A. M. Setapen. *Revue de la Soudure; Lastijidschrift*, v. 6, No. 4, 1950, p. 213-219.

Static-impact and fatigue properties of brazed joints in Armco iron and in several types of steel. Factors influencing these properties, such as strength of the base metal, flux inclusions, and joint design. (Q6, Q7, K9, ST, Fe)

391-Q. Basic Conclusions From the Contact-Hydrodynamic Theory of Lubrication. (In Russian.) A. I. Petrusevich. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Feb. 1951, p. 209-223.

Applicability of the theory in developing an exact mechanism of contact strength and liquid friction, as well as wear and seizing of metals; in correlating various experimental data with a single theory of contact strength and contact-liquid friction; in planning further research on these problems; in developing simpler methods of testing materials, lubricants, and lubricant additives; and in designing new machine parts in the light of these concepts. (Q9)

392-Q. The Strength of Tubes Under Internal Pressure at High Temperatures. E. Siebel and S. Schwaigerer. *Engineers' Digest*, v. 12, June 1951, p. 196-198. (Translated and condensed from *Brennstoff-Wärme-Kraft*, v. 3, May 1951, p. 141-143.)

Stress formulas are developed and examples given for plain carbon and alloy steel tubes. (Q23, CN, AY)

393-Q. Properties of Materials and Engineering Uses of Cast Metals. R. W. Bailey. *Foundry Trade Journal*, v. 90, June 14, 1951, p. 629-636, 641.

Edward Williams Lecture. The question of tensile strength; influence of forging on cast steel; use of Mn-Al brass retaining rings for single-phase turbo-alternators; use of castings at elevated temperatures; cast iron crankshafts; fatigue-testing equipment; spheroidal-graphite cast iron; and the lost-wax process. (Q general, E general, CI, Cu)

394-Q. Temperature and Stress Rate Affect Fractology of Ferritic Stainless. C. A. Zapffe and C. O. Worden. *Iron Age*, v. 167, June 28, 1951, p. 65-69.

Shows that temperature and velocity of fracture are counteracting factors in the fractographic structure of stainless types 430 and 446. Under hammer-blows, these steels show transition to slip-type patterns between 35 and 100° C. Fracture by rifle shot produces identical patterns, but the transition temperature is 150° C. higher. Includes 14 fractographs. (Q26, SS)

395-Q. Effect of Hardness on Temper Brittleness. D. C. Buffum and L. D. Jaffe. *Journal of Metals*, v. 3, July 1951: *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 540.

Results of investigation for SAE 3140 steel. (Q29, Q23, AY)

396-Q. A Study of the Plastic Behavior of High-Purity Aluminum Single Crystals at Various Temperatures. *Journal of Metals*, v. 3, July 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 545-547.

Discussion of above paper by F. D. Rosi and C. H. Mathewson. (Sept. 1950 issue; see item 626-Q). (Q2, Q24, Al)

397-Q. A Study of the Strain Markings in Aluminum. *Journal of Metals*, v. 3, July 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 547-548.

Discussion on above paper by Bani R. Banerjee. (Sept. 1950 issue; see item 622-Q). (Q24, M27, Al)

398-Q. The Textures of Cold-Rolled and Annealed Titanium. *Journal of Metals*, v. 3, July 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 549-550.

Discussion of above paper by Howard T. Clark, Jr. (Sept. 1950 issue; see item 625-Q). (Q24, M23, Ti)

399-Q. The Properties of Some Magnesium-Lithium Alloys Containing Aluminum and Zinc. *Journal of Metals*, v. 3, July 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 556-557.

Discussion of above paper by Robert S. Busk, Donald L. Lemon, and John J. Casey. (July 1950 issue; see item 433-Q). (Q23, N7, Mg)

400-Q. Hydrogen Embrittlement of SAE 1020 Steel. *Journal of Metals*, v. 3, July 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 558-560.

Discussion of above paper by J. B. Seabrook, N. J. Grant, and Dennis Carney. (Nov. 1950 issue; see item 789-Q). (Q23, CN)

401-Q. The Effect of Sodium Contamination on Magnesium-Lithium Base Alloys. *Journal of Metals*, v. 3, July 1951; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 191, 1951, p. 557-558.

Discussion of above paper by P. D. Frost, J. H. Jackson, A. C. Loonman, and C. H. Lorig. (Sept. 1950 issue; see item 627-Q). (Q23, E10, Mg)

402-Q. Strength of Pipes & Spring Material As Affected By Length. Victor Tatarinov. *Steel Processing*, v. 37, June 1951, p. 284-285, 309.

Tests conducted to determine ultimate strength in torsion require certain corrections on specimen's length effect. For that purpose, a reasonable correction factor was introduced into the classical strength formulas. Its values were established from test data, and are plotted. (Q1)

403-Q. Production Evaluation of Cutting Tool Materials. Part II. Thomas Badger. *Tool Engineer*, v. 27, July 1951, p. 44-48.

The following properties of cast alloy cutting-tool materials are compared with those of carbides: red hardness, hardenability, hardness, response to heat treatment, shear strength, tensile strength, compressive strength, wear resistance, toughness, ease of fabrication into finished tools, influence of section size on cutting properties, practical design considerations, and cost. (Q general, SG-j, C-n)

404-Q. Brittle Coatings for Stress Analysis. Part II. Greer Ellis. *Tool Engineer*, v. 27, July 1951, p. 49-50. (Q25)

405-Q. Electrical Resistance Strain Gauges. M. J. Sargeaunt. *Machinery Lloyd* (Overseas Ed.), v. 23, June 9, 1951, p. 79, 81, 83, 85-86.

Includes theory of operation. (Q25)

406-Q. A Mechanism for the Growth of Deformation Twins in Crystals. A. H. Cottrell and B. A. Bilby. *Philosophical Magazine*, ser. 7, v. 42, June 1951, p. 573-581.

By extending the recent theory of slip bands, proposed by Frank and Read, it is shown that a dislocation can move steadily from plane to plane in a crystal. A theory of mechanical twinning, which is formally analogous to Frank's theory of crystal growth is developed. (Q24, N5)

407-Q. The Development of Deformation Textures in Metals. Part II. Body-Centered Cubic Metals. E. A. Calnan and C. J. B. Clews. *Philosophical Magazine*, ser. 7, v. 42, June 1951, p. 616-635.

Qualitative treatment of the development of deformation textures in face-centered cubic metals, described in Part I, is extended to those of body-centered cubic structure. Main features of tension, compression, rolling, and drawing textures are predicted. 13 ref. (Q24, Fe)

408-Q. Analysis of Stresses. (In French.) Pierre Laurent. *Bulletin du Cercle d'Etudes des Métaux,* v. 5, Sept.-Dec. 1950, p. 358-375.

Some particular problems, not the general parameters. Among the points discussed are: deformation, the cold-working curve, the elastic domain and its limits, striction and crystalline structure, and rupture of crystals. (Q24, Q25)

409-Q. Effect of Cold Working on the Internal Friction of Iron and Steel, With or Without a Hydrogen Charge. (In French.) Paul Bastien and Pierre Azou. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 232, May 16, 1951, p. 1845-1948.

Study of 0.08% C steel showed that charging with H_2 by immersion in a solution of HCl and Na_2S has little effect on internal friction unless the steel is first plastically deformed. (Q22, CN)

410-Q. New Dynamic Method for Measuring Constants of Elasticity. (In French.) R. Cabarat. *Metaux: Corrosion—Industries,* v. 26, Mar. 1951, p. 126-130.

Method is applicable to all solid materials over a considerable temperature range. Use of an alternating electric field permits detection of all bodies which are conductors; and, in the case of a dielectric, use of a thin surface layer on the conductor does not appreciably alter the mechanical properties of the material. (Q21)

411-Q. Influence of Internal Tension on Resistance to Corrosion Fatigue. (In French.) Hans Buhler. *Métaux: Corrosion—Industries,* v. 26, Mar. 1951, p. 142-144.

Internal tensions created by hardening and their effect on improving resistance to bending and torsion of plain-carbon steel, were studied. (Q25, R1, CN)

412-Q. Elastic Deformation of Mono and Polycrystals. (In French.) Léon Guillet. *Métaux: Corrosion—Industries,* v. 26, Apr. 1951, p. 153-158.

Elastic constants of various metals, elastic anisotropy of grains and aggregates, modulus of elasticity of alloys, and evidence for allotropic transformations of alloys by thermoelastic methods. Data for various metals and alloys are tabulated and charted. 12 ref. (Q21, N6)

413-Q. Behavior of Cuprous Metals Subject to Permanent Mechanical Stress. (In French.) J. Hérenguel and M. Scheidecker. *Revue de Métallurgie,* v. 48, Mar. 1951, p. 173-181; disc., p. 181.

Effects of various factors on the cracking of brass. Micrographs and macrographs are included. (Q26, Cu)

414-Q. New Methods for Study and Testing of Metals and Their Application To Welded Structures. (In French.) J. J. L. van Maanen. *Revue de la Soudure Lastijdschrift,* v. 7, no. 1, 1951, p. 1-15.

A new theory of M. H. M. Schnadt, including his own definition of values characterizing the strength of welded structures. Theoretical bases of this new theory. Proposes new unit for the energy of plastic deformation. The Schnadt impact-test specimens and their use and the general relationship between stress and deformation. (Q23, Q6, K general, CN)

415-Q. Variations in the Structure of Heat Resistant Steels of the 2¼% Chromium, 1% Molybdenum Type. (In French.) L. Habraken. *Revue Universelle des Mines, de la Métallurgie des Travaux publics, des Sciences et des Arts appliqués a l'Industrie,* ser. 9, v. 94, May 1951, p. 164-180.

Studied by radiocrystallography and electron microscope methods. Variations in chemical composition and rate of cooling were found to cause important structural changes. At least three different structures were isolated and it was shown that the best resistance to creep is obtained when structural modifications are least. Hypothesis is developed that there are two distinct creep processes for steel, just as for pure metals. (Q3, M27, AY, SG-h)

416-Q. Study of Fatigue in Welded Assemblies. (In French.) H. de Leiris. *Soudure et Techniques Connexes,* v. 5, Mar.-Apr. 1951, p. 53-64; disc., p. 64-65.

Welded construction of internal ship structures and stresses to which they are subjected. Compares various methods; design and operation of a hydraulic fatigue-testing apparatus. Results of experiments on nonwelded steel plates, on welds arranged transversely to stress, on sheets joined by welding, on welded assemblies arranged transversely to stress, and finally on welds or assemblies arranged parallel to the stress. (Q7, K9, CN)

417-Q. Preliminary Tests on an Aging Notch-Impact Sample With a Forged Notch. (In German.) Walther Dick. *Archiv für das Eisenhüttenwesen,* v. 22, May-June 1951, p. 161-170.

Experiments were made with as-cast and normalized steel specimens. Results were compared with those of the standard VDM tests. The forged notch is recommended for its economy. However, further experiments are recommended to determine which test is more accurate. (Q6, CN)

418-Q. Determining Aging Notch-Impact Strength With Forged Notches. (In German.) Alfred Krüger. *Archiv für das Eisenhüttenwesen,* v. 22, May-June 1951, p. 171-176.

Results using forged notch were compared with those of the Standard VDM test (machined notch) on unalloyed openhearth and basic steels containing 0.05-0.11% C. Results, which agree rather well in the case of low-C steels, deviate increasingly with increasing C content. (Q6, CN)

419-Q. Discussion of the General Problems of Elongation and Strength in Mechanical Testing. (In Italian.) F. Gatto. *Alluminio,* v. 20, 1951, p. 129-135.

Theoretical mathematical analysis of the relationship between elongation and test duration. Two equations for calculation of the relationship, also their graphical interpretation. (Q27)

420-Q. Investigations of Welded-Structural Parts Made of Steels Having Different Mechanical Properties. (In Russian.) G. P. Mikhailov, A. E. Solomohnikov, and L. A. Kaplan. *Avtogennoe Delo* (Welding), v. 22, Feb. 1951, p. 13-14.

A theoretical method for calculating design of welded structures containing both low-carbon and alloy steels. Experiment shows applicability of proposed formulas. (Q general, K9, CN, AY)

421-Q. Relations Between Initial and Final Orientations in Rolling and Annealing of Silicon Ferrite. B. F. Decker and David Harker. *Journal of Applied Physics,* v. 22, July 1951, p. 900-904.

Investigation of effects of rolling and annealing on orientation of individual grains in silicon ferrite strip yielded results which led to formulation of a theory for the appearance of "magnetic" orientation in the final processed strip. It is believed that the theory can be applied to other systems, although direct experimental evidence exists only in the case of silicon ferrite, a body-centered cubic alloy. Includes pole-figure diagrams and back-reflection Laue photographs. (Q24, P16, SG-p)

422-Q. Anelastic Effects Arising From Precipitation in Aluminum-Zinc Alloys. A. S. Nowick. *Journal of Applied Physics,* v. 22, July 1951, p. 925-933.

Torsion experiments on an Al-Zn alloy (20% Zn) show that precipitation produces large values of internal friction. After prolonged periods of aging, sufficient to produce growth of the precipitate particles, internal friction begins to decrease. Curves of internal friction vs. temperature do not show a peak but rise indefinitely with increasing temperature. This behavior cannot readily be interpreted in terms of the usual concept of a relaxation spectrum, but requires a new concept of "coupled relaxations". Metallographic examination reveals that large internal friction is correlated with discontinuous precipitation. The observed anelasticity is interpreted in terms of fragmentation of the lattice. 23 ref. (Q22, N7, Al)

423-Q. Observations on Some Wrought Aluminium-Zinc-Magnesium Alloys. Maurice Cook, R. Chadwick, and N. B. Muir. *Journal of the Institute of Metals,* v. 79, July 1951, p. 293-320.

High-strength Al-Zn-Mg wrought alloys containing up to 12% Zn, 3.5% Mg, and 3% Cu, as well as Cr, Mn, Fe, and Si in amounts of less than 1% each, were investigated. In addition, the freezing characteristics were investigated to ascertain compositions with small eutectic contents and, hence, desirable casting properties. A comparison was made of the casting and extrusion characteristics of two alloys with similar mechanical properties in the wrought condition, the one having a small and the other a large eutectic content. Superiority of the former was confirmed. 28 ref. (Q general, N12, Al)

424-Q. Properties of Materials Under Extreme Pressures. Percy W. Bridgman. *Machine Design,* v. 23, July 1951, p. 210, 212, 215-216, 220. (Condensed from 5th Chas. M. Schwab Memorial Lecture, presented May 23, 1951, at general AISI meeting in New York.)

Describes work in which pressures of 45,000-180,000 psi. were used routinely, and in which 300,000 psi. was occasionally reached. The unusual behavior of metals at such pressures and some of its practical implications are described and discussed. (Q general)

425-Q. Creep and Fatigue. *Metal Industry,* v. 78, June 29, 1951, p. 528-529.

Factors involved and suggestions for further research. (Q3, Q7)

426-Q. A Method for Assessing the Coiling Properties of Tungsten Wire. W. G. Creasy and G. Wright. *Research,* v. 4, July 1951, p. 323-325.

Method and apparatus design to test coiling property, which is of great importance when the wire is to be used in coils for incandescent-lamp filaments. (Q5, W9)

427-Q. Automatic Stopping Devices Speed Fatigue Tests. *Steel,* v. 129, July 16, 1951, p. 78.

Several devices recently developed at National Bureau of Standards. Auxiliary test equipment includes devices for stopping the testing machine when a small crack forms in a specimen, apparatus for uniform polishing of fatigue test specimens, and for fatigue testing thin sheet specimens in bending. (Q7)

428-Q. New Devices Speed Metal Fatigue Tests. *Technical News Bulletin* (National Bureau of Standards), v. 35, July 1951, p. 103-105.

A few devices developed by John A. Bennett and James L. Baker. (Q7)

429-Q. Fatigue in Light Alloy Assemblies. (In French.) R. Bocconi-Gibod. *Revue de Métallurgie,* v. 48, May 1951, p. 369-375; disc., p. 375.

Classifies types of assembly. Results on welded, plastic-cemented and riveted assemblies. Compares results with those obtained for steel. (Q7, Al, Mg)

430-Q. Molybdenum as an Alloying Element in Structural Steels and Several Tool Steels. (In German.) Hans Ulrich Meyer. *Berg-und Huttenmannische Monatshefte,* v. 96, May 1951, p. 105-116.

The problem of improving the mechanical properties of steel is greatly simplified by the fact that slight amounts of Mo increase their hardenability, produce more uniform properties, and reduce or even eliminate temper brittleness. 20 ref. (Q general, AY, Mo)

431-Q. Grinding and Wear. (In German.) Wilhelm Späth. *Metalloberfläche,* ser. A, v. 5, June 1951, p. A81-A84.

Despite close relationship between grinding and wear, wear tests made by grinding metal articles to be tested often result in completely misleading results. Tests for different types of wear. The adoption of specific and well-defined standards is proposed. 13 ref. (Q9)

432-Q. Effect of Several Production Conditions on the Creep Resistance of Light-Metal Alloys. (In German.) Hugo Voskühler. *Zeitschrift für Metallkunde,* v. 42, May 1951, p. 141-147.

Difference in strength properties between sand and chill-mold castings and between cast and wrought alloys; also the effect of grain size, extrusion temperature, and extrusion preliminary to forging on physical properties. (Q3, Q general, Al, Mg)

433-Q. Application of X-Ray Investigation to Explain the Effect of Yield Point on Fatigue Strength. (In German). Alfred Schaal. *Zeitschrift für Metallkunde,* v. 42, May 1951, p. 147-154.

Study on worked and unworked plain carbon and alloy steels. Includes X-ray diffraction patterns, tables, and graphs. 14 ref. (Q7, M22, CN, AY)

434-Q. (Book) **The Mathematical Theory of Plasticity.** R. Hill. 354 pages. 1950. Oxford University Press, London. (QA931 H55m).

A systematic development of stress-strain relations, laws of yielding and work-hardening in solids, especially metals, is given. Analysis of stresses and strains in technological processes, such as rolling, forging, and drawing is presented. (Q)

R

CORROSION

265-R. Report of Subcommittee II on Performance Tests (To be Appended to Annual Report of Committee B-8 on Electrodeposited Metallic Coatings); Atmospheric Exposure of Copper-Nickel-Chromium Deposits on High-Carbon Steel. H. A. Pray, chairman. *American Society for Testing Materials,* Preprint 13S, 10 pages.

Extensive tabular data and conclusions. Panels were exposed at five locations for 1.5-3.5 yrs. (R3, Cu, Ni, Cr, CN)

266-R. Role of Oxide Composition in Oxidation of Nickel and Cobalt. Robert L. Tichenor. *Journal of Chemical Physics,* v. 19, June 1951, p. 796-797.

Moore and Lee found the rate of oxidation of Co at 500-800° C. in O_2 to be 25 times greater than that of Ni although activation energy is the same for both reactions. Alternative explanations for this phenomenon. By use of certain assumptions, good agreement between calculated relative rates of diffusion and observed relative rates of oxidation was obtained. (R2, Co, Ni)

267-R. Hot Dip Galvanizing. Wallace G. Imhoff. *Industrial Gas,* v. 29, June 1951, p. 6-7, 22-25, 27.

Some of the causes that result in failure at the top of the galvanizing pot. Shortcomings of the old sal ammoniac-muriatic acid dip flux technique still used by many companies. Use of Zn ammonium chloride is recommended. Other causes of failure. (R6, L17, ST, Zn)

268-R. Nickel Alloys Versus Sulphuric Acid. *International Chemical Engineering & Process Industries,* v. 32, June 1951, p. 284-286.

Corrosion resistance of Ni alloys to H_2SO_4 as encountered in the chemical process industries. Considers each of a variety of chemical processes and suitability of different alloys for contact with the different materials and conditions involved. (R5, T28, Ni)

269-R. Stress Corrosion of Cast Bronzes Evaluated. J. T. Clenny. *Iron Age,* v. 167, June 21, 1951, p. 85-89.

Tests of ten cast Cu alloys under stress in an NH_3 atmosphere indicate that Al bronzes (10% Al) offer the best resistance. Four different methods of evaluating the test results were used, including determination of stress-corrosion endurance limits and percentages of loss of tensile strength due separately to stress and corrosion. (R1, Cu)

270-R. Corrosion Resistance of Wrought Iron and Steel Pipe. Elmer Gammeter. *Metal Progress,* v. 59, June 1951, p. 814-815.

Comments on article by S. L. Case (Mar. issue; item 148-R, 1951). Tabulates some data obtained over relatively short periods in industrial and residential areas. (R8, Fe, ST)

271-R. Titanium Resists Stress Corrosion. H. H. Uhlig and J. R. Cobb, Jr. *Metal Progress,* v. 59, June 1951, p. 816.

Tests were made in boiling saturated $MgCl_2$ and also in 10% NaOH. No cracking took place. (R1, Ti)

272-R. Rust—How to Combat It by Proper Design. H. Malcolm Priest. *Railway Mechanical and Electrical Engineer,* v. 125, June 1951, p. 43-50, 60.

Design recommendations made to minimize corrosion of railway rolling stock. (R general, T23, ST)

273-R. The Effect of Silicates on Digester Corrosion. J. C. Hair and A. W. Duskin. *Tappi,* v. 34, June 1951, p. 252-254.

In an attempt to decrease corrosion rate in its digesters (made of ASTM A-10 steel) Crossett Paper Mills added solium silicate and high-silica clays to the liquor system with the anticipation that a protective scale would be formed in the digesters, and corrosion thereby inhibited. Results were negative. (R6, AY)

274-R. Kinetics of the Formation of Oxide Films on Zinc Foil. Walter J. Moore and James K. Lee. *Transactions of the Faraday Society,* v. 47, May 1951, p. 501-508.

Oxidation kinetics of Zn foil at temperatures from 300 to 400° C. and pressures of 1.0-40.0 cm. of Hg. Below 350° C., the rate follows a logarithmic equation. Above 370° C. it follows a parabolic equation. Parabolic rate constant is markedly pressure dependent. This behavior can be interpreted in terms of activated adsorption of O_2 at the ZnO surface. 14 ref. (R2, Zn)

275-R. Periodic Phenomena in the Corrosion of Metals by Vapors. (In French.) R. Dubrisay. *Bulletin de la Société Chimique de France,* Nov.-Dec. 1950, p. 1058-1060.

When a thin sheet of Ag or Cu with a small hole in it is placed over a test tube containing a fragment of iodine, concentric colored rings form around the hole, due to decreasing thickness of iodine formed at increasing distances from the hole. A quantitative study was made of this phenomenon for various periods of time and temperatures up to 70° C. Effects of various factors are thoroughly analyzed. (R9, Ag, Cu)

276-R. Action of Anhydrous Hydrogen Chloride Gas on Beryllium, Magnesium, and Their Oxides. (In French.) Jean Besson. *Bulletin de la Société Chimique de France,* Nov.-Dec. 1950, p. 1175-1179.

Action on above and on alkaline-earth metals, Hg, Zn, and Cd at temperatures up to 1000° C. Be, Mg, Zn, and Cd form chloride films at ordinary temperatures which protect the metal from further attack by HCl gas. This protective action disappears at the fusion point of the chloride layer. 12 ref. (R9, Be, Mg)

277-R. Change in Corrosion Behavior Caused by Wetting Agents. (In German.) Luigi Piatti. *Chimia,* v. 5, Jan. 15, 1951, p. 8-11.

Experiments on the corrosion effect of plain tap water and of tap water with 4% wetting agent on carbon-steel plates show that the wetting agent prevents pitting and results in more uniform corrosion. (R4, CN)

278-R. Experiments on the Zinc-Iron Cell. (In German.) K. Wickert and H. Wiehr. *Werkstoffe und Korrosion,* v. 2, May 1951, p. 165-171.

In model elements for O_2 concentration cells with Fe electrodes, internal resistances are built up. When the metal surfaces are mechanically altered, these resistances cause loss of metal at the cathode, varying with surface condition. Shows that it is useful to include electrochemical as well as mechanical surface activation in the theory of the active surface. Recommendations for cathodic protection of Fe on the basis of a theory that the electrochemically dependent change of activity of a metal surface is caused by the inhibiting effect of electron-acceptors at the cathode. (R1, R10, ST)

279-R. Influence of Thermal Treatment on Rate of Cracking of Carbon Steel Caused By Ammonium Nitrate. (In Polish.) M. Smialowski, E. Gasior, and C. Bieniosek. *Prace Glownego Instytutu Metalurgii,* v. 3, No. 1, 1951, p. 17-22.

Studied for samples of sheet steel containing 0.11% C and 0.034% Al under constant tension and immersed in a 40% aqueous solution of NH_4NO_3, at 98° C. Analysis of the results indicates that the form and the distribution of the cementite phase in steel is related to the rate of cracking. Fe_3Cu is cathodic with respect to Fe and opposes the action of nitrate; but its presence causes the formation of local cells which accelerate the anodic dissolution of material at the grain boundaries. (R1, CN)

280-R. Dezincification of Aluminum Brass Condenser Tubes Prevented by Chlorination and Cleaning. C. L. Bulow. *Corrosion* (News Section), v. 7, July 1951, p. 1.

Effectiveness of the procedure. (R2, L12, Cu)

281-R. Bacterial Casing Corrosion in the Ventura Field. Keith Dolg and A. Wachter. *Corrosion* (Technical Section), v. 7, July 1951, p. 212-224.

Possible causes considered and the more important preventive methods, namely cathodic protection, insulating flanges on wellhead connections, protective coatings, extra casing strings, and full-string cementing. It was concluded that bacterial activity is responsible for the corrosion. Methods for inhibiting or destroying the bacteria were developed. (R1, ST)

282-R. Corrosion in the Ammonolysis of Aliphatic Chlorides. R. S. Tresker and R. F. Miller. *Corrosion* (Technical Section), v. 7, July 1951, p. 225-228.

Corrosion data are presented for a process for manufacture of methallylamine by high-pressure liquid-phase ammonolysis of methallyl chloride. Relative corrosion resistance of a number of alloys was determined for the two most severely corrosive process streams encountered. Study of other combinations of amines and aliphatic chlorides revealed such combinations to be generally corrosive to carbon steel and other common alloys under moderately high temperature conditions. (R7, CN)

283-R. The Corrosion of Titanium in Acids; The Rate of Dissolution in Sulfuric, Hydrochloric, Hydrobromic and Hydroiodic Acids. M. E. Straumanis and P. C. Chen. *Corrosion* (Technical Section), v. 7, July 1951, p. 229-237.

It was found that rate of dissolution of Bureau of Mines titanium in H_2SO_4 and HCl below 2 *N* is extremely low. The rate is still lower in HBr of all concentrations. HI does not react at all with purest Ti. Its resistivity can be explained by the formation of protective layers, which are easily dissolved by HF. Therefore, small amounts of NH_4F, added to the above acids, accelerate greatly the rate of dissolution even in HI. 15 ref. (R5, Ti)

284-R. Stress Corrosion: Its Relation to Other Types of Corrosion. U. R. Evans. *Corrosion* (Technical Section), v. 7, July 1951, p. 238-244.

Corrosion damage is classified into general (unlocalized) corrosion, pitting, general intergranular corrosion, stress corrosion, and corrosion fatigue. Of these, the first causes least weakening, while the last two cause the most weakening. Stress corrosion differs from corrosion fatigue in requiring pre-existing paths of weakness; thus it occurs only on some materials after certain heat treatments. Preventive measures are briefly surveyed. 34 ref. (R1)

285-R. The Role of Peroxides in the Corrosion of Lead by Lubricating Oils. B. S. Wilson and F. H. Garner. *Journal of the Institute of Petroleum*, v. 37, May 1951, p. 225-238.

Corrosion of lead by lubricating oils undergoing oxidation at about 150° C. was studied. Methods were devised for estimation of acidity, peroxide content of the oils, and of corrosion of lead. A theory is proposed to explain the effect of atmospheric oxygen on rate of corrosion by engine oils previously oxidized for several hours in the absence of lead. (R7, Pb)

286-R. The Role of Current Distribution in Cathodic Protection. Homer D. Holler. *Journal of Research of the National Bureau of Standards*, v. 47, July 1951, p. 1-6.

Procedure for determining current distribution over an electrode surface, as required in cathodic protection or in electroplating when the electrode potential bears a known relation to current density. Relation of current distribution to resistance of current path and counter electromotive force. The primary current distribution (without polarization) is also computed. A method is suggested for determining the electrode potential-current density relation over an extensive surface in a uniform medium. (R10, P15)

287-R. Corrosion—Cause and Prevention. Rick Mansell. *Organic Finishing*, v. 12, June 1951, p. 19-21.

Theory of corrosion and prevention methods. (R1, R10)

288-R. Considerations of Current Corrosion Problems in the Pulp and Paper Industry. H. O. Teeple. *Paper Mill News*, v. 74, July 7, 1951, p. 10, 12, 14.

Emphasis on present shortages of certain metals and alloying elements. (R general, T29)

289-R. Corrosion Factors in Design. Fred M. Reinhart. *Product Engineering*, v. 22, July 1951, p. 101-107.

Methods of minimizing attack under six types of exposure: atmospheric, underwater, galvanic, concentration-cell, stress, and fretting corrosion. (R general)

290-R. Recommended Design Details to Reduce Corrosion. *Product Engineering*, v. 22, July 1951, p. 158-159.

Diagrams are briefly explained. (R general)

291-R. Corrosion Fundamentals in Field Application. Alfred Chatenever. *World Oil*, v. 133, July 1, 1951, p. 194, 196, 198, 200.

The relation of fundamental corrosion theory as developed in the research laboratory to actual field practice is clarified to show how complicated studies bring about practical mitigation programs. Chemical and electrical theories of corrosion, and a possible answer to the pitting problem is presented. (R1)

292-R. Protection of Structural Steel Against Atmospheric Corrosion. Part I. General Principles. J. C. Hudson. **Part II. Practical Applications.** W. A. Johnson. *Journal of the Iron and Steel Institute*, v. 168, June 1951, p. 165-180.

In Part I, the approach is theoretical. In Part II, ways and means are considered by which principles may be put to industrial use. The conditions which a "mass-produced" coating should fulfill, and some dependable coatings, which are assumed to be painted later in the usual way. 13 ref. (R3, L general, CN)

293-R. Study of Selective Oxidation of Iron-Nickel Alloys by X-Ray Diffraction. (In French.) Jean Moreau and Jacques Bénard. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 232, May 16, 1951, p. 1842-1843.

A method for determining the variation in composition of very thin metallic layers. Composition of the metallic phase in contact with the oxide was determined for alloys containing 5, 10, 20, and 30% Ni at 850, 950, and 1050° C. (R2, Fe)

294-R. Mechanism of Corrosion Fatigue. (In Russian.) G. V. Karpenko. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 77, Apr. 11, 1951, p. 827-830.

Results of experimental investigation. Two processes are involved: first, formation of fatigue microfissures by adsorption of a corrosive agent during cyclic loading: and second, the corrosion process itself inside cracks already formed, thus promoting their growth. Results obtained with steel. (R1, ST)

295-R. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry*, v. 43, July 1951, p. 91A-92A.

The sigma phase in stainless steels with particular reference to corrosion by liquids. (R5, M26, SS)

296-R. Low Temperature Oxidation of Copper. II. Reaction Rate Anisotropy. T. N. Rhodin, Jr. *Journal of the American Chemical Society*, v. 73, July 1951, p. 3143-3146.

The oxidation rate of single-crystal Cu surfaces exposed to pure O_2 at temperatures from 18 to 323° K. was observed to be highest for the least densely packed (100) face and smallest for the most densely packed (111) face. The rate anistropy is adequately described by the mathematical treatment of Mott and Cabrera, although the physical significance of their assumptions is ambiguous. The reaction-rate anisotropy was also shown to be consistent with the theoretical requirements of Frank and Van der Merwe for the existence of oriented overgrowths. 22 ref. (R2, P13, Cu)

297-R. The Oxidation of Silicon at High Temperatures. Merwyn B. Brodsky and Daniel Cubicciotti. *Journal of the American Chemical Society*, v. 73, July 1951, p. 3497-3499.

Studied between 950 and 1160° C. The metal was found to oxidize very slowly even at high temperatures. An explanation of the logarithmic nature of the reaction is attempted in view of the vitreous nature of the oxide formed. 10 ref. (R2, Si)

298-R. Copper-Nickel-Iron Alloys Resistant to Sea-Water Corrosion. G. L. Bailey. *Journal of the Institute of Metals*, v. 79, July 1951, p. 243-292.

Development of Cu alloys containing 5-10% Ni and 1-2% Fe as materials easily worked by the coppersmith and resistant to corrosion by moving sea-water. The effect of small additions of Fe and Mn on resistance of a 70-30 Cu-Ni alloy to sea-water corrosion. Tests of resistance to impingement attack in moving sea-water containing air bubbles. Corrosion at shielded areas under conditions of rapid water movement. Resistance to attack under stagnant conditions. 22 ref. (R4, Cu)

299-R. Corrosion Tests With Zinc Alloy Die Castings in Damp Gypsum Plaster. L. A. J. Lodder and S. Baumgarten. *Metallurgia*, v. 43, June 1951, p. 273-279.

Occasionally cases of severely corroded Zn alloy electrical conduit fittings are reported—invariably after prolonged contact with a damp wall. Results of a search for suitable protective measures. It is recommended that a chromate treatment be adopted, and that an auxiliary coating be applied specifically to preserve the chromate coating. (R6, L15, Zn)

300-R. Reactions in the Solid State in Oxide Films Formed on Iron. (In French.) Earl A. Gulbransen. *Revue de Métallurgie*, v. 48, May 1951, p. 337-352; disc., p. 352.

Use of electron diffraction at high temperatures. Thermodynamic calculations were made for five types of gas-solid reactions. Shows that in the solid phase, the higher oxides and Fe form FeO at 570-700° C. The formation of Fe_3O_4 and relationships between the two oxides. 29 ref. (R2, N15, Fe)

301-R. The Effect of Copper and Iron on the Corrosion Resistance of Sheets of the Alloy $AlMg_3(Hy_3)$. (In German.) H. G. Petri and G. Siebel. *Metalloberfläche*, ser. A, v. 5, June 1951, p. A84-A93.

Tests made with 17 Al+5% Mg alloys varying in Cu content between 0 and 0.49% and in Fe content between 0.005 and 0.50%, exposed to sea water and aqueous solutions of 3% NaCl+0.1% H_2O and 3% NaCl+1% HCl. Results are presented in the form of tables, graphs, and photomicrographs. (R4, R5, Al)

302-R. Forms and Modes of Corrosive Attack on Aluminum Alloys. II. Effect of Rolling and Heat Treating on the Behavior of an Alloy. (In German.) Hans Kostron. *Zeitschrift für Metallkunde*, v. 42, May 1951, p. 133-137.

Rolling of an Al-Cu-Mg alloy was

found to convert selective grain-boundary corrosion of the cast alloy into more diffuse or stratified corrosion, depending on degree of rolling, while intercrystalline forms of corrosion may occur in rolled and heat treated alloys. (R1, Al)

303-R. The State of Passive Iron, Especially in Nitric Acid. (In German.) Klaus J. Vetter. *Zeitschrift für Elektrochemie und angewandte Physikalische Chemie,* v. 55, May 1951, p. 274-280.

The slight corrosiveness of passive irons was studied. It was found that it is independent of Fe potential and that addition of Cl ions increases its corrosion. Results indicate that the passive layer must be devoid of active pores and that corrosion is the result of the slow solution of the passive surface. 42 ref. (R10, Fe)

304-R. H. H. Uhlig's Electron-Configuration Theory of Passivity; A Critical Evaluation. (In German.) Theo Heumann. *Zeitschrift für Elektrochemie und angewandte Physikalische Chemie,* v. 55, May 1951, p. 287-295.

Shows that, except for Ni, the known physical properties of metals and alloys indicate that the electron exchange demanded by above theory is highly improbable, that any electron exchange would be opposite to that indicated by the theory, and that in heterogeneous alloys their phase states must be considered. 37 ref. (R10)

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270-S. Aluminum-Coil Weight and Length. *American Machinist,* v. 95, June 25, 1951, p. 143.

Nomograms facilitate calculation. (S22, Al)

271-S. Report of Committee A-1 on Steel. N. L. Mochel, chairman. *American Society for Testing Materials,* Preprint 2, 1951, 56 pages.

Recommendations affecting standards on steel; proposed tentative specifications for Ni-Cr-Mo steel bars for springs, for alloy steel seamless drum forgings, for seamless and welded steel tubes for low temperature service, for carbon steel sheets of flange and firebox qualities, and for seamless ferritic alloy-steel pipe for high-temperature service. (S22, CN, AY)

272-S. Report of Committee A-3 on Cast Iron. J. S. Vanick, chairman. *American Society for Testing Materials,* Preprint 3, 1951, 8 pages.

Proposed revised tentative specifications for gray iron castings for pressure-containing parts for temperatures up to 650° F. (S22, CI)

273-S. Report of Committee B-1 on Wires for Electrical Conductors. D. Halloran, chairman. *American Society for Testing Materials,* Preprint 7, 1951, 22 pages.

Proposed tentative specifications for tinned hard-drawn and medium-hard-drawn Cu wire for electrical purposes, and for hard-drawn Cu wire. (S22, T1, Cu)

274-S. Report of Committee B-5 on Copper and Copper Alloys, Cast and Wrought. G. H. Harnden, chairman. *American Society for Testing Materials,* Preprint 10, 1951, 29 pages.

Recommendations affecting standards for Cu and Cu alloys, cast and wrought; proposed revised standard specifications for steam or valve bronze castings and for composition brass or ounce metal castings; also proposed revised standard mercurous nitrate test for Cu and Cu alloys. (S22, Cu)

275-S. A Basic Guide for Management's Choice of Non-Destructive Tests. Robert C. McMaster and Samuel A. Wenk. *American Society for Testing Materials,* "Symposium on the Role of Non-Destructive Testing in the Economics of Production," 1951, p. 3-80; disc., p. 81-82.

Basic principles and essential parts of nondestructive tests and the significant features of 12 basic test methods described in more than 250 patents and about 500 technical articles. Features of nondestructive tests with reference to existing commercial instruments, and principle of operation of each test method; novel features and applications of the significant patents. Lists references and patents. (S13)

276-S. Discontinuities in Cast and Wrought Products That Can Be Revealed by Non-Destructive Tests. Kent R. Van Horn. *American Society for Testing Materials,* "Symposium on the Role of Non-Destructive Testing in the Economics of Production," 1951, p. 83-100; disc. p. 100-101.

The sensitivity limitations and important applications for four extensively used nondestructive tests—radiographic, fluorescent-penetrant, magnetic-particle, and ultrasonic methods. Discontinuities listed in the ASTM terminology that are likely to be detected in nonferrous and ferrous castings and welds by these tests. Discontinuities that may be revealed in wrought products. (S13, Mg, Al, Fe, ST)

277-S. The Role of Non-Destructive Testing in the Economics of Castings. John W. Juppenlatz. *American Society for Testing Materials,* "Symposium on the Role of Non-Destructive Testing in the Economics of Production," 1951, p. 102-108; disc., p. 109-111.

Need for testing, destructive vs. nondestructive testing, importance of design, specifications, and interpretation of nondestructive tests. (S13, E general)

278-S. The Economics and Practical Application of Cobalt 60 in the Radiographic Inspection of Steel Weldments. W. L. Schwinn. *American Society for Testing Materials,* "Symposium on the Role of Non-Destructive Testing in the Economics of Production," 1951, p. 112-131; disc., p. 132-135.

The industrial application of Co-60 in the inspection of steel weldments was investigated by means of a comparison of radiographs taken with this source and with X-rays and gamma rays. Sensitivity charts demonstrate not only relative sensitivity but also the technique required, the economics, and exposure times. These studies indicate that, in certain applications, Co-60 is superior to radium. (S13, Co, ST)

279-S. The Economics of Wrought Steel Inspection. C. D. Moriarity. *American Society for Testing Materials,* "Symposium on the Role of Non-Destructive Testing in the Economics of Production," 1951, p. 136-144; disc. p. 145-147.

The economic value of nondestructive testing to the wrought-steel user. The part ultrasonics and the testing of material in motion has in the saving of man hours. (S13, ST)

280-S. Management's Responsibility for Insistence on Non-Destructive Testing in the Development of New Engineering Products and Processes. Leslie W. Ball. *American Society for Testing Materials,* "Symposium on the Role of Non-Destructive Testing in the Economics of Production," 1951, p. 148-151; disc., p. 152. (S13)

281-S. Spectrophotometric Determination of Nickel in Steel. M. D. Cooper. *Analytical Chemistry,* v. 23, June 1951, p. 875-880.

Range of ratios of Mn and Cu to Ni which can be tolerated in the sample solution, and a simple method of correcting for the interference. The retarding effect of Mn on color development may lead to serious error in determination of Ni at trace levels in steel. Comparative data show that this spectrophotometric method is superior to gravimetric and titrimetric methods from the standpoint of precision as well as speed. 11 ref. (S11, Ni, ST)

282-S. Spectrophotometric Determination of Nickel in Aluminum Alloys. M. D. Cooper. *Analytical Chemistry,* v. 23, June 1951, p. 880-883.

Two methods, which differ with respect to the method of removing Cu, and a third method with satisfactory precision for routine analysis. (S11, Ni, Al)

283-S. Ultraviolet Spectrophotometric Determination of Vanadium. George Telep and D. F. Boltz. *Analytical Chemistry,* v. 23, June 1951, p. 901-903.

General procedure developed is suitable for determination of 0 to 125 p.p.m. of V and should be applicable to a variety of samples. (S11, V)

284-S. Modified Vacuum Fusion Apparatus for Determination of Oxygen, Hydrogen, and Nitrogen in Certain Metals. A. F. Torrisi and Jean L. Kernahan. *Analytical Chemistry,* v. 23, June 1951, p. 928-929.

Apparatus has been modified to increase its rate of output. (S11)

285-S. Radioisotopes in Industry. G. D. Calkins. *Chemical and Engineering News,* v. 29, June 18, 1951, p. 2456-2459.

Applications in numerous branches of science and technology. Present status and future prospects, and reasons which have caused hesitation on the part of industry in organizing programs for utilizing radioisotopes. 43 ref. (S19)

286-S. Gamma-Ray Tests of Pipe Welds. Alexander Gobus. *Combustion,* v. 22, June 1951, p. 45-48.

Procedure employed in examination of field welds by means of radiography with gamma rays. Necessary precautions. (S13)

287-S. Pneumatic Servomechanisms in the Iron and Steel Industry. A. A. Markson. *Instruments,* v. 24, June 1951, p. 647-649, 690-691.

Advantages and limitations of air as a control fluid in a servomechanism. Transmission factors associated with pneumatic signals, including pressure range and speed of transmission. Typical oil-operated and air-operated servomechanisms for controlling the heavy damper of a furnace, together with relative advantages and disadvantages of each type. Design problems for air-operated power units. (S18, ST)

288-S. Hydraulic Servocontrols in the Steel Industry. H. Ziebolz. *Instruments,* v. 24, June 1951, p. 650-651, 689-691.

Advantages and disadvantages of hydraulic servo systems and a method for obtaining proportional-plus-reset control with a hydraulic system. (S18, ST)

289-S. Non-Contact Gaging. J. T. Welch. *Instruments,* v. 24, June 1951, p. 652-654, 691.

The X-ray gage for measuring the thickness of continuous strip, and the air gage for measuring the thickness of fabricated parts. Principles, construction details, and numerous applications. (S14)

290-S. Radiographic Inspection of Steel Castings. John M. Flanagan. *Instruments,* v. 24, June 1951, p. 655, 688-689.

History of the method. Compares various radiographic methods in general use. Importance of contracts

and specifications in radiographic inspection. (S13, CI)

291-S. Instruments Unsnarl Metal Mixups. Anthony Doschek. *Iron Age*, v. 167, June 21, 1951, p. 92-96.

See abstract of "Methods for Sorting Mixed Metals," *Instruments*, item 233-S, 1951. (S10)

292-S. Identification of 3 Stainless Alloys Simplified. A. W. Smolla. *Iron Age*, v. 167, June 21, 1951, p. 97-98.

Limitations of the available electrical systems are by-passed by a qualitative chemical method for identifying Types 316, 321, and 347 stainless. Side trim or end scrap is used and only beakers, chemicals, and heat are required for identification. (S11, SS)

293-S. New Magnetic Particle Testing Technique Speeds Inspection of Ferrous Parts. S. G. Kelley, Jr. *Materials & Methods*, v. 33, June 1951, p. 66-68.

Modified method which detects surface defects occurring in any direction in one operation. (S13)

294-S. "Standard" Size and Grade Die Sections Established for Sintered Carbides. E. J. Reitler. *Modern Industrial Press*, v. 13, June 1951, p. 24, 26, 28.

New standards apply to a wide range of sizes for punches, perforators, pilots, bushings and rectangular sections. They are supplied in a "universal" grade of sintered carbide. (S22)

295-S. Analysis of Solids in the Mass Spectrometer. *Technical News Bulletin* (National Bureau of Standards), v. 35, June 1951, p. 84-86. (Condensed from paper by J. G. Gorman, E. J. Jones, and J. A. Hipple, *Analytical Chemistry*, v. 23, Mar. 1951, p. 438-440.)

A method of compensating for fluctuation in the source is illustrated by determination of Ni and Cr content of six stainless steels. The results agree well with the composition determined chemically. This initial success indicates that the mass spectrometer should find wide application in the routine, rapid analysis of solids. (S11, SS)

296-S. From a Metallurgist's Notebook: Plated Coil Springs. H. H. Symonds. *Metal Industry*, v. 78, June 8, 1951, p. 469.

Isolated intergranular films of oxide were found to be the cause of cracking in Ag-plated brass coil springs submitted for examination. (S21, Q26, Ag, Cu)

297-S. Comparative Study of Results Obtained by Reduction Melting Under Vacuum and by Gotta's Process. (In French.) J. Varetto and L. Lacomble. *Revue Universelle des Mines, de la Métallurgie des Travaux Publics, des Sciences et des arts appliques a l'Industrie*, v. 94, Feb. 1951, p. 70-73.

For determination of total O_2 in steel, ie., reduction fusion under vacuum and cementation using Al, or Gotta's method. Emphasizes particularly the difficulties encountered; also sources of error and methods for their minimization. (S11, ST)

298-S. Spectrographic Determination of Impurities in Zinc and Its Alloys. (In Polish.) W. Klimecki and J. Kurylowicz. *Prace Glownego Instytutu Metalurgii*, v. 3, no. 2, 1951, p. 97-114.

Results of extensive investigation for various impurities. Recommended procedures. 13 ref. (S11, Zn)

299-S. The Spectrographic Determination of Uranium in Ores and Ore Products. David Kaufman and Carl W. Perkins, Jr. *U. S. Atomic Energy Commission*, AECD-2834, Aug. 25, 1948, 19 pages.

A d.c. arc was used for excitation. Direct burning of a 10-mg. sample, simple chemical concentration procedures, separation of U by ether extraction, and selective volatilization of U as fluoride were unsuccessful. By the addition of AgCl, most of the material was volatilized in a preburning period, and the U, which was not volatilized, was accurately determined down to 0.05% U_3O_8 on what was left. (S11, U)

300-S. Electro Magnetic Wire Rope Tester. (In English.) Masashi Naito. *Bulletin of the Electrotechnical Laboratory* (Japan), special no., Mar. 1950, p. 37-43.

Principles of the test method, construction of the apparatus, and typical test data. (S13)

301-S. Chromographic Contact Print Method of Examining Metallic Minerals and Its Applications. David Williams and F. M. Nakhla. *Bulletin of the Institution of Mining and Metallurgy*, June 1951; *Transactions*, v. 60, pt. 9, 1950-51, p. 389-399.

Discusses above paper by David Williams and F. M. Nakhla (see item 192-S, Apr. 1951 issue). (S11)

302-S. Metal Wall Thickness Measurement From One Side by the Ultrasonic Method. N. G. Branson. *Electrical Engineering*, v. 70, July 1951, p. 619-623.

Principles of method and an instrument for making such measurements. Selection of quartz crystals and range, accuracy and limitations of the method. (S14)

303-S. A Magnetic Method for Measuring the Temperature of Moving Wires. A. Moles. *Engineers' Digest*, v. 12, June 1951, p. 187-188. (Translated and condensed from *Mesures & Controle Industriel*, v. 16, Mar. 1951, p. 97-98.)

The necessity for accurately measuring the temperature of a moving wire arises in the continuous heat treatment of steel wire and strip of diameter or thickness ranging from ½ to several millimeters. The arrangement uses the principle of temperature variation of the magnetic permeability of ferrous metals, is simple and convenient, and makes possible remote recording. (S16, ST)

304-S. New Temperature-Gradient Box Checks Furnace Characteristics. M. Bozsin. *Finish*, v. 8, July 1951, p. 30-31.

Special insulated box travels through continuous or box-type enameling furnaces. By means of a 6-point recorder, it checks temperature gradients for each of six locations, giving a complete chart record. In a test run with a furnace setting of 1560° F. and 17 min. furnace travel, a maximum temperature of 86° F. was reached inside the recording instrument. (S16)

305-S. Melting Brass and Bronze. James G. Dick. *Foundry*, v. 79, July 1951, p. 88-89, 153-154, 156, 158.

Previously abstracted from *Canadian Metals*. See item 325-S, 1950. (S22, E general, Cu)

306-S. Statistical Quality Control. H. H. Johnson. *Foundry*, v. 79, July 1951, p. 92-97, 189-191.

Application in the foundry. (S12, E general)

307-S. The *Iron Age* Chart of Comparable Tool Steel Brands. *Iron Age*, v. 167, June 28, 1951, insert between p. 70 and 71.

Third edition of chart shows equivalent brands manufactured by different U. S. companies for each of the ASM classes and subclasses. (S22, TS)

308-S. Analyzing Stabilized Stainless Now Takes Less Time. J. F. Young. *Iron Age*, v. 168, July 12, 1951, p. 91-92.

Chemical-spectrographic analysis of Ta-Cb line-intensity ratio and weight ratio is at least as accurate as any other routine method. Also, it is said to be faster than point-to-plane technique, and does not require use of stainless-steel standards. (S11, SS)

309-S. Magnetic Particle Inspection of Welded Pipe and Tubing. J. E. Clarke, R. A. Peterson, and T. J. Dunsheath. *Nondestructive Testing*, v. 9, Spring 1951, p. 7-13.

The process and its application. (S13, ST)

310-S. Radiography With Cobalt 60. Adair Morrosion. *Non-Destructive Testing*, v. 9, Spring 1951, p. 14-22, 29.

Shows that Co^{60} can readily be substituted for Ra in industrial radiography. Advantages; data for steel are charted. 10 ref. (S13, ST)

311-S. Extruded and Drawn Steel Cartridge Cases Advance Toward Standardization. W. F. Stevenson. *Steel*, v. 129, July 9, 1951, p. 72-76, 98, 101-102, 105.

Development of joint Army-Navy procedures for mass-producing artillery components from low- and medium-carbon steel. Sizes range from 20 to 155 mm. (S22, T2, G4, CN)

312-S. Segregates in Steel Analyzed Spectrographically. *Steel*, v. 129, July 9, 1951, p. 78-80. (Based on paper by J. Convey.)

Special spectrographic techniques devloped for studying metal structures of many alloys, particularly the more complex types, and for making a continuous analysis of variation across a segregate. (S11, ST)

313-S. Production Problems. V. Steel Blanks for Brake Assemblies. *Iron and Steel*, v. 24, June 1951, p. 198.

Metallurgical investigation of above pieces which had been found to be unsatisfactory because of deviation from specified composition and also presence of decarburization. Deviation in composition was found to be relatively unimportant; decarburization was found to be caused by the fact that a rimming rather than a fully killed steel was used. (S21, CN)

314-S. The Control of Electric Element Furnaces to Fine Limits at High Temperatures for Research Purposes. T. W. Lomas, M. D. Jepson, and J. R. Rait. *Journal of the Iron and Steel Institute*, v. 168, June 1951, p. 126-134.

A problem in the measurement of corrosion, tensile properties, creep, rupture, fatigue, etc. Various types of controller. A commercial resistance thermometer/thyratron instrument is shown to be the most suitable on the grounds of cost, availability, and performance. Various types and their useful ranges. (S16, Q general)

315-S. Calibration Furnaces for Total-Radiation Pyrometers. E. J. Burton and R. Mayorcas. *Journal of the Iron and Steel Institute*, v. 168, June 1951, p. 151-155.

An electrically heated graphite-tube furnace 36 in. long and 3 in. internal diam. emits radiation which is substantially that of a black body and provides a sufficiently large source (at least 3 in. diam.) for existing industrial pyrometers. Temperature of the furnace may be rapidly changed within the range of calibration. (S16)

316-S. Control and Instrumentation of an Experimental Furnace. (In French.) G. W. Stein-Callenfels and R. Mayorcas. *Chaleur & Industrie*, v. 32, Mar. 1951, p. 59-70.

Design and auxiliary equipment of a tunnel furnace 7.5 m. long, 2 m. wide, and 2 m. high, made of refractory bricks 22 cm. thick. Regulation and control equipment. Chart records. (S16, S18)

317-S. Some Causes of Error in the Ultrasonic Testing of Metal Pieces. (In French.) Paul Bastien. *Métaux: Corrosion—Industries*, v. 26, Mar. 1951, p. 135-141.

Errors are caused by anomalies of propagation. The problem is still in

the experimental state from the industrial standpoint. (S13)

318-S. On the Technique of Gamma-Ray Control. (In French.) H. Gerbeaux and M. Evrard. *Métaux: Corrosion—Industries,* v. 26, Apr. 1951, p. 159-165.
Apparatus, protection of personnel, and practical applications. (S13)

319-S. Use of Radioactive Elements in the Study of Steel and Industrial Metallurgical Processes. Applications to the Study of Segregations. (In French.) A. Kohn. *Revue de Métallurgie,* v. 48, Mar. 1951, p. 219-235.
44 references. (S19)

320-S. Observations on Inspection by Means of Gamma Rays. (In French.) M. Gerbeaux and M. Evrard. *Soudure et Techniques connexes,* v. 5, Jan.-Feb. 1951, p. 31-37.
Use of gamma rays for inspection of welds. Experiments performed and apparatus. (S13)

321-S. The Qualitative Analysis of Alloy Steels. (In German.) Claus Beermann and Helmut Hartmann. *Archiv für das Eisenhüttenwesen,* v. 22, May-June 1951, p. 159.
Simple spot-test procedures for V, Mn, Cr, Mo, and W in steels. (S11, AY)

322-S. Blast Furnace Instrumentation. E. T. Mortson and S. T. Paisley. *Blast Furnace and Steel Plant,* v. 39, July 1951, p. 789-799.
Various types of instruments. (S16, S18, D1, Fe)

323-S. Northrop Checks All Castings by Fluoroscopy. Thomas E. Piper and Justin G. Schneeman. *Machinery* (American), v. 57, July 1951, p. 172-177.
Principles of above nondestructive method of inspecting vital Al and Mg castings and its application. (S13, Al, Mg)

324-S. (Book) **Engineering Metrology.** K. J. Hume. 293 pages. Macdonald & Co., Ltd., 43 Ludgate Hill, London E. C. 4, England. 18 s.
Basic principles of the subject, illustrated with descriptions of contemporary equipment and methods of application. Chapters deal with mathematics, mechanics, optics, and heat and temperature: precision measuring and equipment used; the various standards of measurement; the question of limits and fit; and operations employed in manufacturing gages. (S14)

325-S. (Book) **Symposium on the Role of Non-Destructive Testing in the Economics of Production.** 157 pages. 1951. American Society for Testing Materials, 1916 Race St., Philadelphia. (Special Technical Publication 112.)
Pertinent papers are abstracted separately. (S13)

T

APPLICATIONS OF METALS IN EQUIPMENT

277-T. Aluminum Honeycomb Sandwich Construction. T. P. Pajak. *American Society for Testing Materials,* Preprint 117, 1951, 7 pages.
The combination of Al facings, Al core, and a specially developed adhesive results in a structural material with desirable high strength and rigidity characteristics. Advantages are uniform density, high specific strength, high shearing modulus, and resistance to environmental effects with constant strength under variable humidity and temperature conditions. (T26, K12, Al)

278-T. Aluminum Alloys in Heat Exchanger Construction. E. G. Kort and J. S. Hamilton. *American Society of Mechanical Engineers,* Advance Paper 50-A-123, 1950, 14 pages.
Corrosion resistance, ASME Code considerations, service history, and others of importance to the engineer. (T5, R general, Al)

279-T. Ductile Steel Tubing at Low Cost Replacement for Copper in Radiant Heating. *Architectural Forum: The Magazine of Building,* v. 95, June 1951, p. 206.
(T27, ST, Cu)

280-T. Heat Application Fundamentals. M. H. Mawhinney. *Industrial Heating,* v. 18, June 1951, p. 978-980, 982, 984, 986, 988, 990, 992, 994, 996.
Practical approach to heat balance, heat transfer, and burner capacity in industrial furnaces. Various furnace forms and early developments in industrial-furnace practice. Simplified formulas for computing heat loss, fuel required, and coefficient of convection in various furnaces. (T5, J general)

281-T. Schoolmasters Look at Aluminium. E. G. Woodiwiss. *Light Metals,* v. 14, June 1951, p. 355-358.
Report of light-metal handicraft work demonstrated at recent annual conference of the Institute of Handicraft Teachers (Middlesex Branch.) (T9, Al)

282-T. Saving Weight With Magnesium Housings. R. G. Gillespie. *Materials & Methods,* v. 33, June 1951, p. 78-80.
In applications where weight saving is worth the additional expense, Mg can sometimes replace steel and Al in housing assemblies without loss of necessary strength. (T7, Mg)

283-T. Characteristics and Applications of Standard Aluminum Rivet Alloys and Tempers. *Materials & Methods,* v. 33, June 1951, p. 105.
A data sheet. (T7, Al)

284-T. Use of Finely Divided Metals in Explosives. D. Hart and W. R. Tomlinson, Jr. *Metal Progress,* v. 59, June 1951, p. 788-792.
Utilization of powdered metals in high explosives, pyrotechnics, propellants, and primers. Use of Mg for incendiary bombs and flares. Explosives containing powdered metals, principally Al, were also used in mines, grenades, and large shells. Mg-Al alloys, Zr, Ni, Ti, Si, Fe, Mn, Zr-Ni alloys, and the hydrides of Zr and Ti are used in various ways. Method of incorporation (dry blending or as a fluid slurry), performance properties, and safety precautions. Pertinent properties of 13 metallic elements used in military ammunition are tabulated. (T2, Al, Mg)

285-T. Saving Precious Alloys by Intelligent Use of Alternatives. *Metal Progress,* v. 59, June 1951, p. 817-830.
Transcript of a panel discussion of Western Metal Congress, Oakland, Calif., Mar. 21, 1951. Refers only to ferrous metals and their alloying ingredients.
(T general, Ay ST)

286-T. Future Sales Will Dwarf Aluminum Window Industry's Spectacular Postwar Gains. F. L. Church. *Modern Metals,* v. 7, June 1951, p. 23-27.
Various types, and their advantages. (T26, Al)

287-T. Model 20 Trailer Carries an Extra Ton of Freight. *Modern Metals,* v. 7, June 1951, p. 29-30.
Trailer made entirely of Al by Highway Trailer Co., Edgerton, Wis. One of the chief manufacturing problems encountered was solved by having two important curved parts contour formed. A saving of $20,000 in die costs and $14.00 per trailer, was thus realized. (T21, G6, Al)

288-T. Smart Redesign of a Coffeepot Cuts Manufacturing Cost 35%; Boosts Sales 3-Fold in a Year. *Modern Metals,* v. 7, June 1951, p. 32.
Emphasis on the use of Al. (T10, Al)

289-T. Sea-Going Aluminum; Applications in Big New Liner and Torpedo Boats. *Modern Metals,* v. 7, June 1951, p. 50.
(T22, Al)

290-T. Design and Fabrication of Steam Piping. A. W. Rankin and R. W. Clark. *Welding Journal,* v. 30, June 1951, p. 508-522.
Selection of material, stress calculations and welding procedures in the design and welding of high-temperature steam piping.
(T27, K general, AY)

291-T. California's Proposed Fifteen-Million-Dollar All-Welded Freeway Viaduct in San Francisco. Leonard C. Hollister. *Welding Journal,* v. 30, June 1951, p. 523-528.
Reviews some of the prewar welded bridges, the use of welding in bridge construction during the war and the contemplated use of welding in above viaduct.
(T26, K general)

292-T. High-Strength Pressure Vessel. *Welding Journal,* v. 30, June 1951, p. 538-539.
Welded stainless-steel spherical storage chamber for use by the U. S. Air Force in rocket-propelled aircraft experiments.
(T26, K general, SS)

293-T. Tungsten Carbide Tipped Rock Drill Bits. J. C. Heaslip. *Canadian Mining and Metallurgical Bulletin,* v. 44, June 1951, p. 419-423.
Development, methods of attachment and various advantages.
(T28, C-n)

294-T. Aluminium-Alloy Aircraft Hangar. *Engineering,* v. 171, June 1, 1951, p. 654-655.
Hangar at the London airport.
(T26, Al)

295-T. Light-Alloy Rolling Stock for London Transport. *Engineering,* v. 171, June 8, 1951, p. 705-707.
Stresses and bending moments throughout the cars. (T23, Al)

296-T. Substitute Materials for Making Foudrinier Cloth. (In Polish.) E. Zalesinski. *Prace Glownego Instytutu Metalurgii,* v. 3, no. 1, 1951, p. 65-73.
For the woven-wire mat used in papermaking, proposes use of Si-Mn bronze for the warp and Ni brass for the weft, as substitutes for Sn bronze, which is hard to get because of the Sn shortage. The new alloys meet all strength and corrosion resistance requirements. Conditions of melting and casting, two methods for plastic working: rolling, cutting out a spiral from plate, and drawing it; and rolling of a bar from round ingot and drawing to wire. Methods of welding and soldering wire cloth. Comparative corrosion data.
(T29, F28, K general, Cu)

297-T. Indium, Its Application and Possibility of Recovery From Metallurgical Products. (In Polish.) M. Schneider. *Prace Glownego Instytutu Metalurgii,* v. 3, no. 1, 1951, p. 75-84.
Reviews literature on applications of In. Significance as an alloying element for increased corrosion resistance. Also use in manufacture of jewellers' goods, metallic ornaments, dental alloys, and low-melting-point alloys. Contents of In in various Zn ores. In is recovered from Pb obtained as by-product in refining of Zn by New Jersey Zinc Co. Believes Pb obtained in Polish Zn works should contain more In than raw Zn or other by-products from Zn production. 40 ref.
(T general, C22, In)

298-T. Weather-Proof Windows of Die Cast Aluminum. *Die Castings,* v. 9, July 1951, p. 20-22.
(T26, Al)

299-T. A New Method of Joining Mitered Extrusions. *Die Castings*, v. 9, July 1951, p. 24.

Unique method of securing miter joints of Al extrusions for doors and windows depends upon the ductility of die-cast Zn angles. (T26, Zn)

300-T. Design of a Portable Tool. *Die Castings*, v. 9, July 1951, p. 26-28, 53.

Redesign of portable electric saw from Mg sand castings to Al die castings. (T6, Al)

301-T. Small Air Cylinder Design. *Die Castings*, v. 9, July 1951, p. 31, 54.

Use of Al die castings in device made by Bellows Co., Akron, Ohio. (T25, Al)

302-T. Fluid Coupling Design. *Die Castings*, v. 9, July 1951, p. 32-34.

Use of Al die castings in fluid drives made by American Blower Corp., Detroit. (T25, Al)

303-T. Die Cast Worm and Helical Gearing. *Die Castings*, v. 9, July 1951, p. 19, 52-53.

Gearing used in a special typewriter lifting mechanism for office desks. Three Zn die castings are used. (T7, Zn)

304-T. Secondary-Emitting Surfaces in the Presence of Oxide-Coated Cathodes. S. Nevin and H. Salinger. *Electrical Communication*, v. 28, June 1951, p. 103-105.

Experiments show that the deleterious effect of oxide cathodes on secondary-emitting surfaces of Ag-Mg can be overcome by using Ta instead of Ni as the base metal for the oxide coating. 10 ref. (T1, P15, Ta)

305-T. Making Electrical Contacts Stand Up in Control Service. Frank E. Reeves. *Electrical Manufacturing*, v. 47, Jan. 1951, p. 102-106, 204, 206, 208, 210, 212, 214.

How to design contacts to avoid early failure; advantages and limitations of available contact materials; steps to take in increasing contact life for both a.c. and d.c. circuits. (T1, SG-r)

306-T. Here Are the Details of the Preliminary Research and the Actual Laying of the First Experimental Aluminum Marine Pipe Line. Edward T. Wanderer. *Oil and Gas Journal*, v. 50, July 5, 1951, p. 58-59, 76. (T4, Al)

307-T. New Vacuum Tube Materials. A. P. Haase and E. B. Fehr. *Tele-Tech*, v. 10, July 1951, p. 33-35.

Latest developments in Al-clad Fe as replacement for Ni as an anode material. (T1, Al, Fe)

308-T. Trade Names of Electrodes and Comparable AWS-ASTM Designations. *Welding Engineer*, v. 36, Mid-June 1951, p. 17.

A data sheet. (T5)

309-T. Trade Names of Resistance-Welding Electrode Alloys and RWMA Specifications. *Welding Engineer*, v. 36, Mid-June 1951, p. 18.

A data sheet. (T5)

310-T. Use of Aluminum Tuyeres. (In French.) M. Moutot. *Circulaire d'Informations Techniques*, v. 8, No. 5, 1951, p. 545-552.

Advantages with respect to durability and lightness. (T5, Al)

311-T. Aluminum-Base Bearing Alloys. (In French.) *Fonderie*, Mar. 1951, p. 2408-2409.

Composition as now prepared in various countries. (T7, Al, SG-c)

312-T. Evaluating the Design and Size of Regenerators. (In German.) Werner Heiligenstaedt. *Stahl und Eisen*, v. 71, May 24, 1951, p. 568-575.

Shows that the brick checker-work design is the most important factor in the efficiency of a regenerator, since its primary function is that of accumulating and storing heat. The shape of the wind channels is shown to be unimportant. Total efficiency of the regenerator is expressed by the ratio of utilized weight of brick to weight of blast per unit of time. (T5)

313-T. The Construction and Operation of Thoria Resistor-Type Furnaces. S. M. Lang and R. F. Geller. *Journal of the American Ceramic Society*, v. 34, July 1, 1951, p. 193-200.

Construction, operation, and approximate cost of furnaces heated with oxide resistors of the Nernst filament type consisting essentially of thoria. (T5)

314-T. Light Alloy Hangar at London Airport. *Metallurgia*, v. 43, June 1951, p. 295-296. (T26, Al)

315-T. Aulgraph Trimetal Plate. Stanley E. Potter. *Modern Lithographer and Offset Printer*, v. 47, May 1951, p. 90-91, 93; June 1951, p. 113, 115, 117.

Development of above printing plate. The surface of the plate must perform two different opposite tasks —to accept and retain grease and water, respectively. Hence, the plate has two metals in the surface and a third one as the base. Experiments made to determine the best metal for each purpose. (T29)

316-T. Stainless High Alloy Steels—Current Developments Affecting the Pulp and Paper Industry. J. M. Wilcox and James T. Gow. *Paper Trade Journal*, v. 133, July 13, 1951, p. 80, 82-84.

Commonly used designations for the different grades of high-alloy steels, with particular emphasis on the difference between wrought and cast grades. Sources of supply of the various elements and raw materials which go into high-alloy steels, and present availability or scarcity. Substitutions of more readily obtainable alloy steels for those grades which are now difficult to obtain are suggested for both acid and alkaline pulping processes. (T29, AY, SS, SG-g, h)

317-T. Festival of Britain: Light-Alloy Gangways Used in Festival Ship "Campania". *Sheet Metal Industries*, v. 28, July 1951, p. 675. (T22, Al)

318-T. Special Copper Alloys for Electrical Work. *Times Review of Industry*, new ser., v. 5, July 1951, p. 25-26.

Properties and applications. (T1, P15, Cu)

319-T. Molecular Distillation. (In French.) R. Gresillon. *Revue de l'Aluminium*, v. 28, May 1951, p. 186-187.

Use of Al for construction of apparatus for above process. (T8, Al)

320-T. New Light-Alloy Passenger Cars of the Belgian National Society of Local Trains. (In French.) Joseph Renglet. *Revue de l'Aluminium*, v. 28, May 1951, p. 188-192.

Details of construction from Al alloys. (T23, Al)

321-T. Where is Agriculture Going? *Revue de l'Aluminium*, v. 28, May 1951, p. 201-203.

Trends in agricultural machinery. Various applications of Al and its alloys in such equipment shown at a recent French fair. (T3, Al)

322-T. (Book) **Forschungshefte aus dem Gebiete des Stahlbaues, Heft 7. Uber den Einfluss hochfester Stähle auf Gewichtserparnis und Bauart im Stahlbrückenbau.** (Research in Steel Construction. Vol. 7. The Influence of High-Strength Steel on Weight Economy and Design in Steel-Bridge Construction.) O. Erdmann. 83 pages. 1950. Springer-Verlag, Germany. 10 Dm.

Theoretical considerations as well as structural and design characteristics involved in the use of certain low-alloy high-strength steels for the construction of bridges. The various structural members and also construction methods such as welding, are considered. (T26, ST)

V

MATERIALS
General Coverage of Specific Materials

88-V. Magnesium, Lightest of the Light Alloys. C. J. P. Ball. *Light Metals*, v. 14, June 1951, p. 329-334.

Production, properties, and applications. (Mg)

89-V. Wrought Aluminum Alloys. Philip O'Keefe. *Materials & Methods*, v. 33, June 1951, p. 89-104.

Special section covers nomenclature and alloy composition, available forms, physical and mechanical properties, corrosion and chemical resistance, working wrought alloys, joining; and finishes for Al. (Al)

90-V. The Story of Nickel and Cobalt. Charles A. Scarlott. *Westinghouse Engineer*, v. 11, July 1951, p. 117-123.

Location and extent of deposits, methods of recovery and refining, properties, fabrication, and applications. (Ni, Co)

91-V. Developments in Magnesium Alloys. H. G. Warrington. "Progress in Metal Physics" (Interscience Publishers, New York), p. 121-148.

Reviews and correlates work since 1942. Includes structures and transformation, physical and mechanical properties, and corrosion resistance. 53 ref. (Mg)

92-V. A Versatile Aluminum-Copper-Silicon Alloy. A. P. Penn. *Metal Treatment and Drop Forging*, v. 18, June 1951, p. 246-248. (A condensation.)

Mechanical properties of the Al-Cu-Si alloy known as DTD 424. Effect of heat treatment on sand cast and gravity die cast pieces; effect of aging; corrosion resistance; and applications. (Al)

93-V. Nickel-Free Stainless Steels; A Review of Compositions, Properties, and Uses. C. B. Tupholme. *Sheet Metal Industries*, v. 28, June 1951, p. 541-545.

Compositions and mechanical properties. (SS)

94-V. Zirconium. (In German.) W. v. Haken. *Chemie-Ingenieur-Technik*, v. 23, May 1951, p. 251-253.

Properties, production, and uses of Zr and its alloys; also the Zr-bearing minerals and their occurrence, and status of large-scale production in the various countries. (Zr)

95-V. Advances in Copper and Its Alloys. John R. Freeman, Jr. *Canadian Metals*, v. 14, June 1951, p. 10-12, 48.

New developments in production and use. (Cu)

96-V. Zirconium. G. L. Miller. *Machinery Lloyd* (Overseas Ed.), v. 23, June 9, 1951, p. 68-69, 71, 73.

Production, properties, and applications. (Zr)

97-V. (Book) **Engineering Materials Manual.** T. C. DuMond, editor. 386 pages. 1951. Reinhold Publishing Corp., 330 West 42nd St., New York 18. $4.50.

A collection of material published as "manuals" in *Materials & Methods* during the last few years. 28 sections, each presenting the complete story of a single material or group of materials. Sections on irons, steels, stainless steels, Al, Mg, Cu alloys, several types of finishes and coatings. Fundamentals of each subject are explained for people without previous experience in the field. (CN, SS, AY, TS, CI, Al, Mg, Ni, Cu, C-n, SG-c, SG-m)

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CHIEF ENGINEER: For industrial furnace manufacturer located in middle-west. Application information will be held confidential. Box 8-10.

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RESEARCH METALLURGISTS: Excellent opening for metalurgists with interest in knowledge of modern methods in fields of corrosion, welding and heat treatment. Prefer men with advanced college training but not essential. Should be able to initiate and execute overall research program. Excellent opportunities for advancement in growing organization. Write: Metals Dept., Armour Research Foundation, Chicago 16.

GRADUATE METALLURGIST: Preferably with M. S. degree, with at least three years plant experience, for research and development work on stainless steels for elevated temperature service. Unusual opportunity for properly qualified person in well-known specialty tubing plant in Pittsburgh district. Give qualifications, education and chronological summary of experience in first letter. Enclose photograph. Box 8-15.

PHYSICIST: Preferably Ph. D., will consider M.S. degree, to do development work in spectroscopy, x-ray diffraction and similar work. Unusual opportunity for qualified person. Should have at least three years of industrial experience. Person must have initiative to work out control program in a steel mill at well-known specialty tube plant located in Pittsburgh area. Box 8-20.

ENGINEER TRAINEE: Recent metallurgical or other engineering graduates, for sales or technical field service training positions with well-established, nationally active heat treating furnace manufacturer. Excellent opportunity to gain valuable knowledge and experience in all metallurgical applications. Midwest location while training. $300 per month plus extras. Box 8-25.

RESEARCH METALLURGIST: Thorough training in physical metallurgy and the structure of metals. Recent graduate acceptable. Advanced degree desirable. Field includes metallography, radiography, welding, elevated temperature evaluation, alloy development, foundry process studies. Well-established firm expanding under aggressive management. Box 8-30.

FOUNDRY CONTROL METALLURGIST: Engineering education desirable. Assistant in staff group engaged in testing and control of foundry alloys, sand, and trouble shooting. Firm operates both ferrous and nonferrous foundries. Well recognized in its field, under progressive management. Offers opportunity for advancement for competent young man. Box 8-35.

STEEL SALESMAN: To sell and service specialty steels, including toolsteels. Knowledge of metallurgy essential. Territory—Illinois and parts of Wisconsin, Michigan and Ohio. Please state age, experience and salary expected. Box 8-155.

East

METALLURGIST: Large manufacturer of process equipment has unusual opportunity in research and development for man well trained in corrosion resistant metals. A few years experience desirable but not essential. Starting salary determined by training and ability. Excellent prospects for advancement. Location New York State. Box 8-40.

FOUNDRY SUPERINTENDENT: For shop producing 500 tons carbon and alloy steel, 300 tons electric iron, and 150 tons brass pressure vessel castings per month. Must have extensive experience in foundry operations, proven administrative ability, good practical and technical background. Excellent opportunity with long-established company of best reputation. Box 8-45.

METALLURGICAL ENGINEER: With at least five years experience in the ferrous field. Must have thorough working knowledge of wrought and cast ferrous alloys and related processes of casting, heat treatment, fabrication. Must be able to act as consultant to product and design engineers, solve production problems, and set standards and specifications. Box 8-50.

METALLURGICAL ENGINEER: At least five years experience in the nonferrous field. Must have thorough working knowledge of wrought and cast copper-base alloys and related processes of casting, heat treatment, fabrication, and familiarity with other nonferrous alloys. Must be able to act as consultant to product and design engineers, solve production problems, and set standards and specifications. Box 8-55.

HEAT TREATING SUPERVISOR: For ferrous metal products manufacturer in southwestern New York. Capable of supervising variety of heat treating operations, modern equipment, testing, analysis. Practical, all-around experience. College training desirable but not essential. Box 8-60.

WELDING ENGINEER: Plant in southeastern Pennsylvania doing heavy fabrication of machinery and component parts. Minimum five years experience or B.S. in Met., M.E., or Chem. Eng., plus general knowledge of welding techniques and procedures. Contacts with customers and plant technical personnel. Age 30 to 40. State salary desired first letter. Box 8-65.

TWO SALES DEVELOPMENT ENGINEERS: Wanted by manufacturer of stainless steels and alloys. Opportunities for advancement limited only by capabilities of applicants. Both recent metallurgical engineering graduates and those with metallurgical experience will be considered. Please give complete resume of experience along with several paragraphs on why you think you are fitted for this type of work. Box 8-160.

POSITIONS WANTED

METALLURGICAL ENGINEER: M.S. degree. Age 40. Twelve years experience as chief metallurgist and laboratory director for large fabricator. Sixteen years experience in welding, machining, deep drawing, spinning, heat treatment and forging of the more common ferrous and nonferrous alloys. Considerable experience in stainless steels. Publications. Prefer midwest but will consider other offers. Box 8-70.

LIBRARIAN: Woman with twenty years experience, six years in steel industry, currently in graduate library school, would like a position in the metals industry. Anywhere in United States. Available Sept. 15. Box 8-75.

METALLURGIST: M.S. degree. Age 34. Several years of diversified experience in production and research. Desires employment in Minneapolis-St. Paul area. Box 8-80.

METALLURGICAL ENGINEER: M.S. degree. Age 28, married, veteran. Experience includes metallography, physical testing, heat treating and radiography. Education includes powder metallurgy and x-ray diffraction. Desires position in research and development with opportunity to expand responsibility. No geographical prefence, foreign or domestic. Box 8-85.

METALLURGIST: M.S. degree. Age 34. Thirteen years experience in heat treatment, chemical and metallurgical laboratory control and rolling mills. Experienced in metallographic work. Presently in charge of hardening shop and control laboratories in India. Desires work as assistant research metallurgist in automobile concern. Box 8-90.

METALLURGIST: Indian student with M.S. degree in physical metallurgy desires experience in applied metallurgy before returning to India. Presently employed as research metallurgist with University of California. Box 8-95.

MANUFACTURERS AGENT: Man with 30 years experience in engineering, mechanical laboratory and quality control, in detail, and in executive and corporate positions, desires to represent manufacturers of mechanical equipment in sales capacity. Will consider establishment and/or management of sales and service headquarters. Has wide personal acquaintance with Niagara Frontier purchasing agents and executives. Box 8-100.

METALLURGIST or SALES ENGINEER: Graduate metallurgical engineer desires responsible position with progressive company. Present position entails supervision and technical field contacts with leading alloy steel producer. Age 35. Married. Has had excellent training for chief metallurgist for smaller company or for sales. Wishes to change for further advancement. Box 8-105.

METALLURGICAL ENGINEER: Age 32. Degree. Five years experience in heat treating, brass and gray iron foundry process control, nonferrous rolling and extruding, corrosion research, metallography, and routine chemical analysis. Prefer Japan or foreign location, but will consider any location in the United States. $7200 minimum. Box 8-110.

PHYSICAL METALLURGIST: Ph.D. degree. Age 35. Broad experience in ferrous physical metallurgy including isothermal transformation and mechanical properties at low and high temperatures. Supervising and some part-time teaching experience. Numerous technical publications. Interested in research and development or teaching. Box 8-115.

SERVICE METALLURGIST: Metallurgical engineer with ten years metallurgical and industrial experience in large corporation, desires permanent connection in smaller company. Enjoys trouble shooting and process development. Best references. Box 8-120.

METALLURGIST: Age 43. Experience includes 15 years steel mill control and field metallurgy in flat rolled products. Six years in resistance welding research in ferrous, nonferrous and high temperature alloys. X-ray experience on aluminum qualification welding. Capable of establishing and operating physical laboratory. Midwest preferred. Box 8-125.

METALLURGICAL ENGINEER: Age 35. Married. B.S. degree. Experience includes 11 years in steel mill, casting, rolling, forging and heat treatment. Control metallurgical, naval ordnance materials for six years, and semifinished products two years. Desires position with production or research department in supervisory capacity, east of the Mississippi River. Box 8-130.

RESEARCH AND TRAINING DIRECTOR or RESEARCH FOUNDATION ADMINISTRATOR: Recognized scientist and educator, background of major research into surface, colloid and bio-chemistry, development of new physical analysis methods, technical papers, educational reports, technical college teaching, academic procedures, curricula administration and development, and thorough knowledge of all phases of research institutes and foundations. Desires a position in industry which will challenge his entire background. Box 8-135.

METALLURGICAL ENGINEER: Desires sales, sales engineering, or responsible metallurgical position in Cleveland area. Age 30, married, one child. Experience includes specification work, development, investigation and report writing. Excellent background on problems relating to manufacture and heat treatment of low alloy and stainless steel, aluminum, brass and cast iron parts. Box 8-140.

METALLURGIST: Age 35. Manager and chief engineer of cold drawing division of largest steel mill in Finland, visiting World Metallurgical Congress in October, desires employment of a few months' duration with a modern U. S. steel mill in practical capacity. Salary no object. Box 8-145.

NONFERROUS METALLURGIST: Age 50, single. Graduate Freiberg University and Carnegie Tech. Broad experience in copper, aluminum and precious metals (refining, casting, semi-finished), in U.S.A., Germany, Netherlands. Editor of English-German technical dictionary. Presently head of physical testing and patent department in West Germany. Desires consulting position in U. S. Box 8-150.

Compliments

To CLYDE E. WILLIAMS, director, Battelle Memorial Institute, on the presentation of a D.Sc. degree by Ohio State University, and also on the award of a Scroll of Honor by the Ohio Chapter of the American Institute of Chemists.

♦ ♦ ♦

To J. B. JOHNSON, head, metallurgy group, Office of Air Research, Wright Field, and a newly elected trustee of the American Society for Metals, on the receipt of the Thurman H. Bane Award for 1951, presented by the Institute of the Aeronautical Sciences "for outstanding contribution in the field of high-temperature materials used in aircraft propulsion units".

♦ ♦ ♦

To R. H. NODERER, chief metallurgist of the Johnstown Works, U. S. Steel Co., on the completion of 47 years of service with U. S. Steel, and the honors awarded to him on his retirement.

♦ ♦ ♦

To NELSON EVANS COOK, general superintendent of galvanizing for the Wheeling Steel Corp., on receipt of the Annual Award of the Galvanizers Committee, sponsored by the American Zinc Institute.

♦ ♦ ♦

To HARRY A. SCHWARTZ, research manager of National Malleable and Steel Castings Co., on the award of the 1951 Charles H. McCrea Medal at the annual banquet of the Malleable Founders' Society.

♦ ♦ ♦

To VICTOR A. CROSBY of Climax Molybdenum Co. on the award of the 1951 John A. Penton Gold Medal of the American Foundrymen's Society for "outstanding service to the Society and for his contributions to the dissemination of information relating to ferrous foundry metallurgy."

♦ ♦ ♦

To ALFRED A. BOYLES of the research department, United States Pipe & Foundry Co. (also author of the A.S.M. text, "The Structure of Cast Iron") on the award of the John H. Whiting Gold Medal of the American Foundrymen's Society "for fundamental studies on the mechanization of graphitization of gray cast iron".

Spanish Steel Men to Meet

The Spanish Iron and Steel Institute has announced its second general meeting, to be held in Madrid Dec. 10 through 15, 1951. The meeting will be preceded by group visits to important manufacturing centers in other parts of Spain. Further information may be secured by writing to the Instituto Espanol del Hierro y del Acero, Villanueva 15, Madrid, Spain.

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The table of contents lists the 19 subdivisions and classifications of the industry with explanatory notes on each. This classification is based on the recently published ASM-SLA Metallurgical Literature Classification, perfected by a joint committee of the American Society for Metals and the Special Libraries Association. This logical and practical arrangement of the subject matter in the book is supplemented by a complete subject index liberally sprinkled with cross-references, for quickly and easily locating the information you need on any phase of metallurgy.

The abstracts are better designated as annotations, since they are brief notes indicative of the contents and not a substitute for a reading of the article or book. All of these brief digests were prepared by the expert librarians and abstractors on the staff of Battelle Memorial Institute. The extensive holdings in the Battelle library insure a complete coverage of both domestic and foreign literature.

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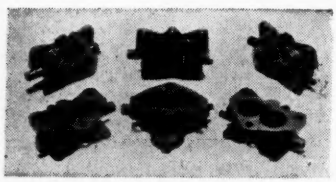
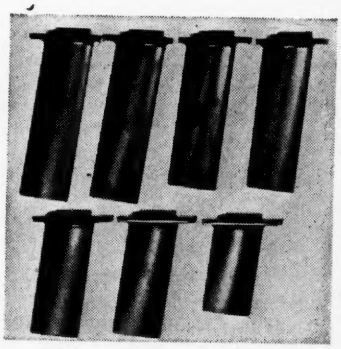
2. Rinse in cold water.



Cast Iron

3. Dip in Holden Pre-Clean Chemical at 160-180° F. for 30 seconds to one minute.
4. Quench in cold water.
5. Process in Holden PERMA-BLACK — average time 5-10 minutes.



Stainless Steel

6. Rinse in cold water.
7. Oil with soluble oil or other suitable rust preventive.

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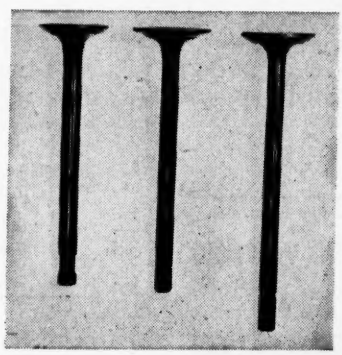

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